
Cloud vs. Grid: a land of opportunity?

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Six² in a nutshell

- **Six² provides:**
 - *“Agile tools and application for automated build, integration, deployment and test of complex software development”*
 - *“Agile software consultancy and services”*
- **Activities centred on ²One Application**

²OneTM

Background and Motivation

- **Grid and cloud comparative study**
 - “An EGEE Comparative study: Grids and Clouds- evolution or revolution?”, by Marc-Elian Bégin
 - <https://edms.cern.ch/file/925013/3/EGEE-Grid-Cloud.pdf>
- **Six² builds agile tools for software development**
 - Deployed as Software as a Service (SaaS)
 - We need to transparently deploy on
 - Public or “outer” clouds (e.g. Amazon AWS)
 - Private or “inner” clouds
 - Need open source cloud distribution, following the Amazon cloud model (EC2 and S3)

Grid: Unique Features

- **What makes the Grid unique and valuable?**
- **Collaboration**
 - Platform for dynamic and distributed collaborations: Virtual Organization
- **Federation**
 - Platform for federating existing resources into a whole
 - Together offers more than the sum of its parts

Scheduled = 21539
Running = 25374

Archeology
Astronomy
Astrophysics
Civil Protection
Comp. Chemistry
Earth Sciences
Finance
Fusion
Geophysics
High Energy Physics
Life Sciences
Multimedia
Material Sciences

...

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>250 sites
>48 countries
>50,000 CPUs
>20 PetaBytes
>10,000 users
>150 VOs
>150,000 jobs/day



Cloud: Unique Features

- **Ease of use**
 - REST and HTTP(S)
- **Runtime environment**
 - Hardware virtualisation
 - Gives users full control
- **Elasticity**
 - Pay-as-you-go
 - Cloud providers can buy hardware faster than you!

Cloud: Amazon Web Services

- **EC2 (Elastic Computing Cloud) is the computing service of Amazon**
 - Based on hardware virtualisation (Xen)
 - Users request virtual machine instances, pointing to an image (public or private) stored in S3
 - Users have full control over each instance (e.g. access as root, if required)
 - Requests can be issued via SOAP and REST

Cloud: Amazon Web Services

- **S3 (Simple Storage Service) is a service for storing and accessing data on the Amazon cloud**
 - From a user's point-of-view, S3 is independent from the other Amazon services
 - Data is built in a hierarchical fashion, grouped in buckets (i.e. containers) and objects
 - Data is accessible via SOAP, REST and BitTorrent
- **Elastic Block Store**
 - Locally mounted storage
 - Highly available
 - Possible to breakpoint to S3

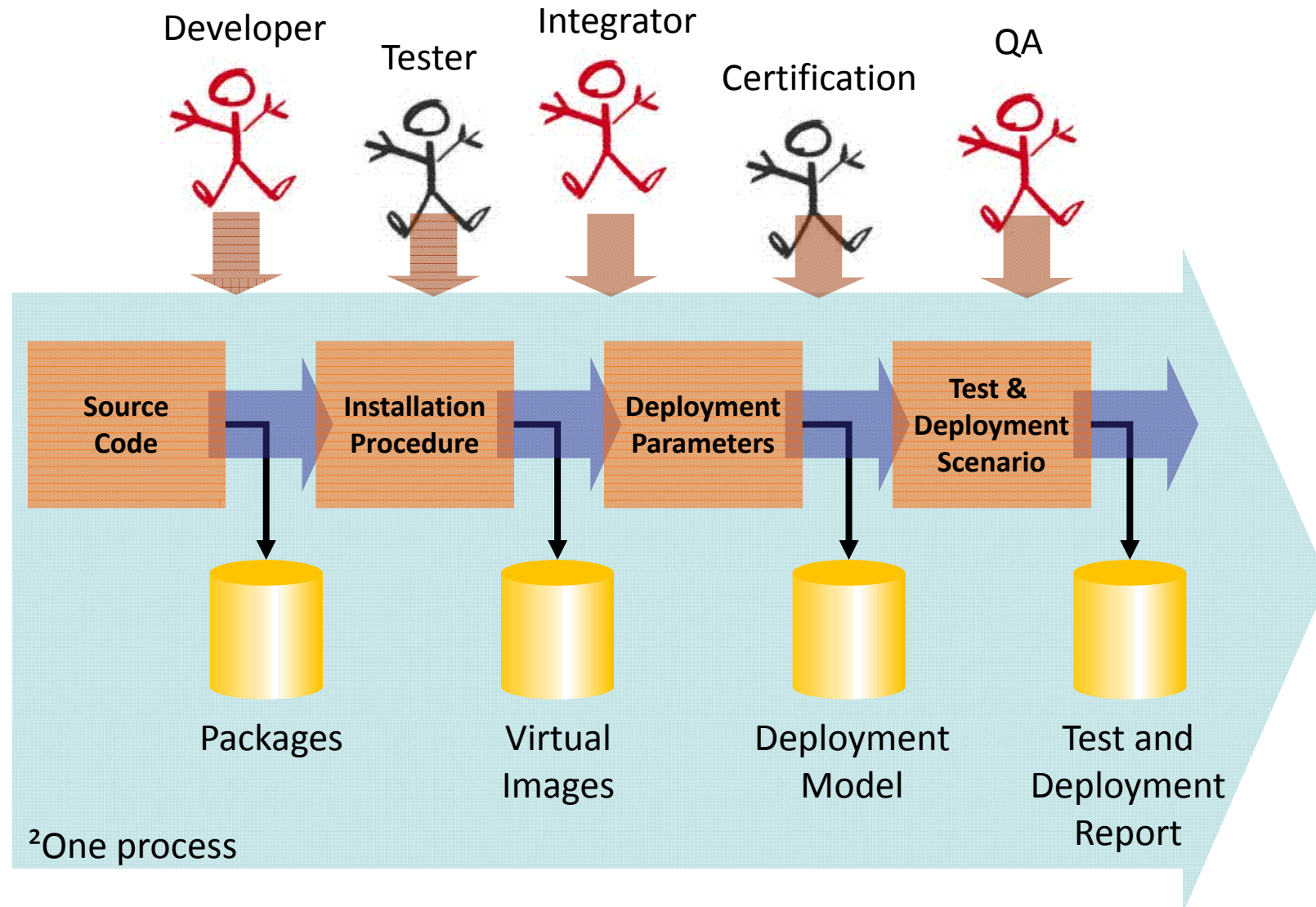
Cloud: Amazon Web Services

- **Other AWS services:**
 - SQS (Simple Queue Service)
 - SimpleDB
 - Billing services: DevPay
 - Elastic IP (Static IPs for Dynamic Cloud Computing)
 - Multiple Locations

Six²'s Experience with the Cloud

- **One Build and Test Application build on the Cloud**
- **Goal: “SaaS for software stakeholders to automatically, and continuously, build, integrate, deploy and test distributed software systems”**
- **Benefit:**
 - Maintain at all time the ability to release
 - Reduce risk: minimises integration and deployment risk at the end of a development cycle
 - Reduce time to market: can go from idea to product faster since production pipeline automated
- **This means**
 - Provide hardware on-demand
 - Let users define their own runtime environment
 - Give users full control on their build and test environment
 - ... in other words provide them a **Cloud application!**

²One Process Overview



How is the Cloud Enabling ²One?

- **Virtualisation provides separation between infrastructure and user runtime environment**
- **Users specify virtual images as their deployment building blocks (generated by ²One or not)**
- **Pay-as-you-go allows users to use the service when they want and only pay for what they use**
- **Elasticity of the cloud allows users to start simple and explore more complex deployment over time**
- **Simple interface allows easy integration with existing systems (no need to take over the world)**

Combining Technologies

- **Six²'s experience with AWS is excellent**
 - Reliable and dynamic
 - Simple and well documented
 - Issues with constraints on kernels investigated
- **Grids should be built on clouds !!**
 - Keep the Grid promise
 - Enable more and stronger collaboration
 - Simplify site management
 - Improve user experience
- **Business opportunities**
 - Offer with the same cost model cloud services to commercial and academic/public users
 - Enable labs to offload peak demand to commercial sites (“inter” cloud)
- **Obstacle**
 - Middleware must be
 - Simple to operate
 - Robust and resilient
 - Adapt to existing infrastructures
 - Open source

Cloud Standards

- **Need for standard?**
- **Yes but 'defacto' standards already exist, e.g.:**
 - EC2 and S3 for service interface and semantic (REST)
 - HTTP(S)
 - Xen for image virtualisation format
- **Since the cloud is simple and based on several existing standards we're not stuck waiting for standardisation bodies**

Build the Grid on the Cloud !

- **What's missing?**
 - Opportunity to demonstrate these concepts in a grid context
 - Open source cloud distribution
 - Partners willing to get it done!

Conclusions

- **Grid / Cloud fusion makes sense**
 - Cloud computing is getting traction, especially with Amazon Web Services (AWS) commercial offering
 - Grid (e.g. EGEE) has a larger scope than cloud, however, technological choices and simple interfaces of clouds like AWS is relevant to the grid world
- **What makes cloud services like AWS successful**
 - Hardware virtualisation
 - REST and HTTP(S)
 - These technologies should displace existing grid middleware
- **Business opportunity**
 - Thanks to cloud computing, we can bring the grid promise to the business world
 - Provide resources to commercial and academic users using same infrastructure and services
- **Grid made the cloud possible...**
it's part of the same “next big thing”!!