Abstracting application deployment on Cloud infrastructures

Application deployment on Cloud

Common requirements from users

- ✓ The application and its supporting services should be highly available
- ✓ Horizontal scaling should be as painless as possible
- ✓ The entire application stack should be deployable on a range of different clouds with minimal friction
- ✓ Focus on high level aspects of the application
- ✓ Virtual infrastructure resources should be abstracted away
- ✓ Application complexity should not get in the way

Challenges with an IaaS-only approach

- ✓ Infrastructure-as-a-Service is a low-level abstraction
- ✓ Horizontal scaling is difficult and requires human intervention
- ✓ Re-deploying the application stack is error-prone and time consuming
- ✓ All aspects of the application lifecycle are not covered
- ✓ Virtual infrastructure resources are the highest abstraction level available
- ✓ Highly specialized skillset required to deploy a complex application

Goals

- ✓ Provide a suitable abstraction level which hides the IaaS details as much as possible
- ✓ Automate all aspects of the application lifecycle from deployment to scaling
- ✓ Make deployments reproducible across clouds with similar characteristics

Abstraction layer

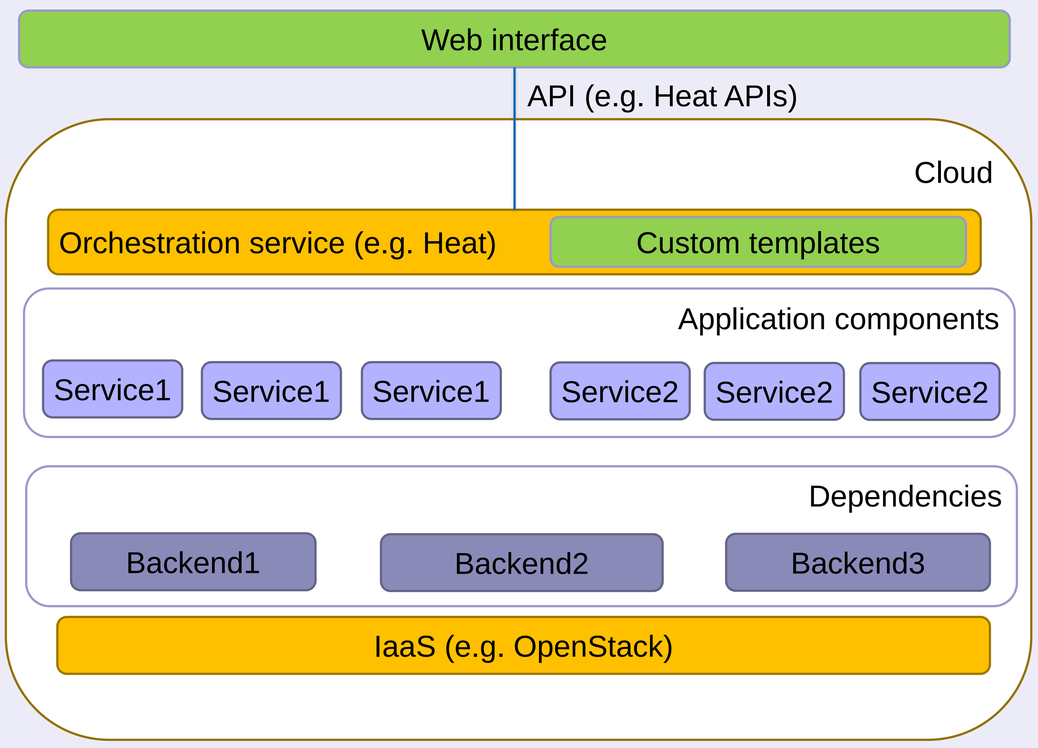
We developed a two-level abstraction layer to simplify application deployment

Cloud side abstraction – Orchestration custom templates

- ✓ Abstraction from application details
- ✓ Application components and dependencies such as back-ends (e.g. databases, filesystem, cache system) are described by custom templates
- ✓ Control on the order of services instantiation
- ✓ Error chance limited
- ✓ Deployment time decisively reduced
- ✓ Significant advantage in deploy recurring infrastructures and testbeds

User side abstraction - Web interface

- ✓ Abstraction from application details
- ✓ Abstraction from Cloud infrastructure
- ✓ Easy-to-use instrument for not skilled users
- ✓ Possibility to scale the application

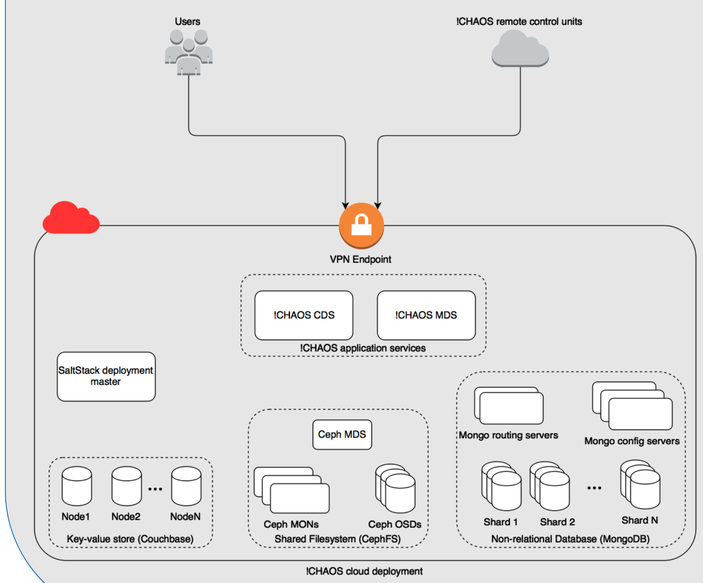


Components highlighted in green are developed ad-hoc

Use cases

Present

!CHAOS
http://chaos.infn.it



- ✓ Control system based on Highly Abstracted and Open Structure
- ✓ Orchestration through OpenStack Heat
- ✓ PHP based GUI exploiting Heat APIs
- ✓ Manually scaling backend components
- ✓ Deployment time reduced from days to minutes

Future

INDIGO - DataCloud
https://www.indigo-datacloud.eu

- ✓ EC Horizon 2020 project
- ✓ Standardization of the Orchestration service based on TOSCA templates
- ✓ Standard Web interfaces as Future Gateway programmable interface
- ✓ Dynamic deployment of a virtual site for interactive analysis
- ✓ Virtual batch systems on opportunistic cloud

OPEN CITY PLATFORM
http://www.opencityplatform.eu

- ✓ Italian Project funded by Government
- ✓ Automated deployment and scaling of high-demand applications for Public Administrations

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