

Web application hosting with Openshift, and Docker images

Alex Lossent – IT-CDA-WF

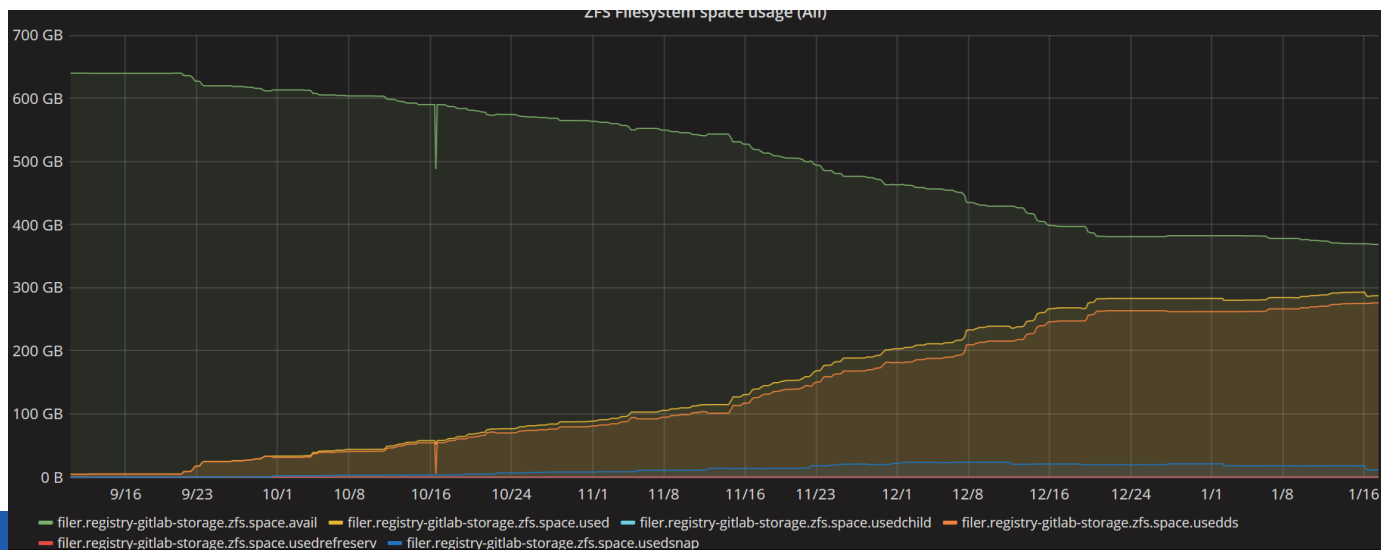


Outline

- Docker images
 - Image build
 - Registry
- Web Application Hosting with Openshift
 - Web hosting overview
 - Use cases
 - Central service hosting
 - Application templates
 - Custom user applications
 - Architecture

Docker images

- Image build automation with GitLab-CI
 - Dedicated *runner* tag
 - Custom Docker image with access to Docker daemon to run 'docker build'
 - User-provided script ignored
- Docker registry: GitLab Container Registry
 - Common hierarchy and permissions with GitLab projects



Web Hosting: overview

- CERN Web Services
- Hosting 13000 “central” sites

CERN Accelerating science Signed in as: alossent (CERN) [Sign out](#)

Web Services

Manage your CERN websites

Home My websites **Service Status** Review your websites Help Support Administration

Current site is <http://cern.ch/test-openshift1>

Your access level is: **Site owner**

- View details of **test-openshift1**
- Manage this site
- Open website

Toolbox for current site

- Delete **test-openshift1**
- Site Access & Permissions
- View quota usage
- Security scan
- Piwik web statistics
- OpenShift application tools**
- Manage your site
- User documentation

Site definition

Site name	test-openshift1	
Description	Openshift dev cluster demo	[Change]
Category	Test site	[Change]
Owner	ALOSSENT (Alexandre Lossent - IT/CDA) Account info	[Transfer ownership]
Site moderators	no site moderator	[Manage moderators]
Registered on	25-May-2016 11:24	
Type	PaaS Web Application	
Status	Validated	
Expiration date	11-Apr-2017	[Extend 3 months] [Change]
Aliases (0)		[Add alias]

Authoring information

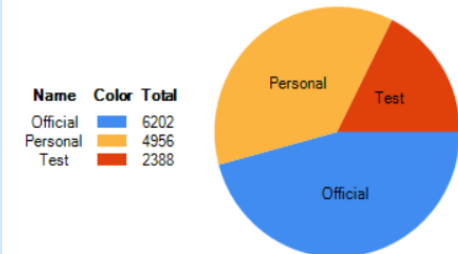
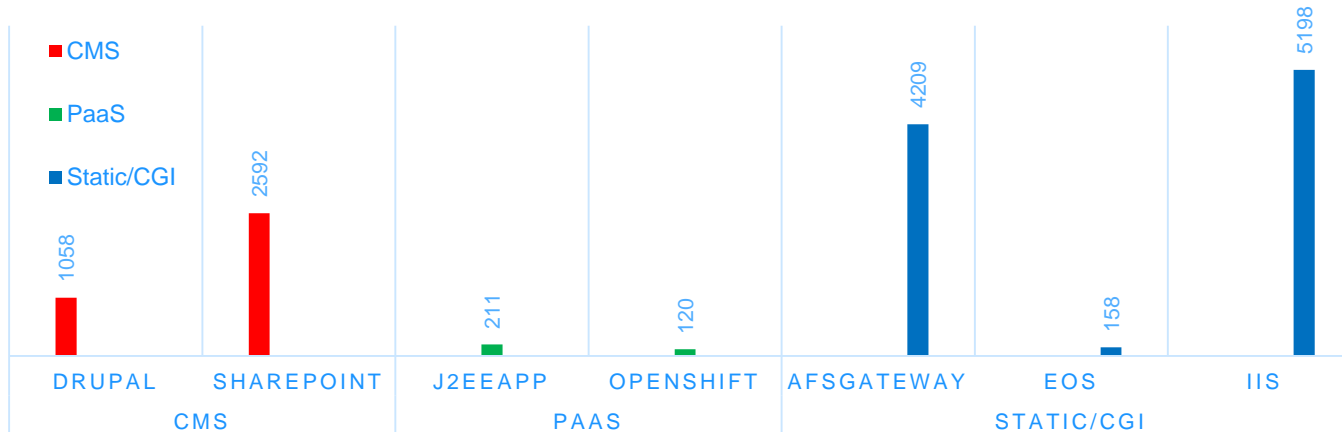
OpenShift sites are updated and managed through OpenShift portal. [More info...](#)

Information about the host web server

Hosted on a central server	True
Server name	oonodelbdev.cern.ch
Server DNS alias	test-openshift1.web.cern.ch
Host description	OpenShift development cluster
Hosted there since	25-May-2016 11:24

Look up a site Detailed search

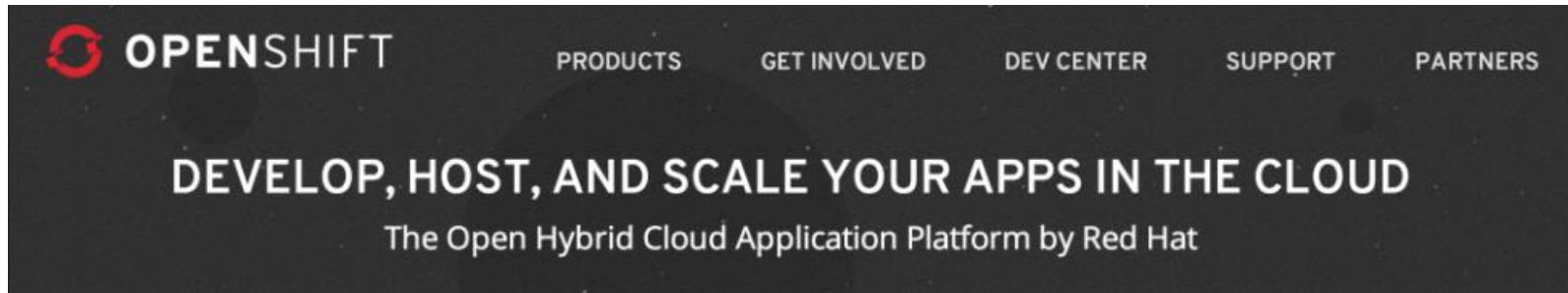
Site name: [Search](#)



Web Hosting

- Common features for all “central” sites
 - Ownership/lifecycle management (FIM)
 - SSO, visibility (Intranet/Internet)
 - Review & (un)block by security team
- Hundreds of independent web servers
 - Need for a library/framework version not provided in “central” sites
 - Large web applications
 - How to reduce the need for such servers?

Openshift: overview



- A container orchestration platform based on Kubernetes
- Adds features that facilitate hosting of web applications

Openshift: use cases

- Initial motivation: PaaS for Jenkins instances
 - Evaluated Openshift v2, then v3 end 2014

- Expanded scope

- Platform to host “central” services (from CDA)



- Provide CERN users with self-service application templates

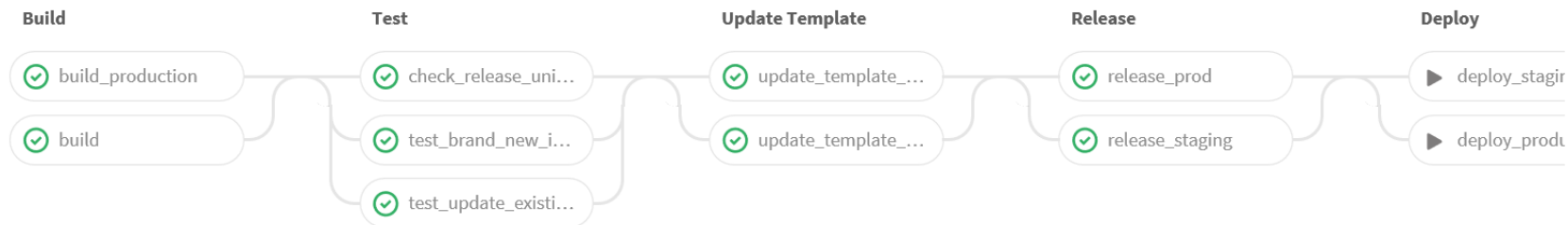


- Increase flexibility of central web hosting and support custom web apps without dedicated VMs



Openshift as a tool for developers

- Facilitate deployment and operation of web applications:
 - Getting started with a web application/prototype
 - Automate application deployment, rollback changes
 - No need to maintain a VM and its OS
 - Switch hosting platform (container portability)
- Good integration with code hosting (GitLab)
 - CI/CD pipelines (GitLab/Jenkins)
 - GitLab Review apps



Openshift CI example

The screenshot shows the Jenkins interface for a pipeline named 'custom-haproxy-router'. The left sidebar contains navigation options: Back to Dashboard, Status, Changes, Build with Parameters, Delete Pipeline, Configure, Move, Full Stage View, and Pipeline Syntax. Below this is the 'Build History' section with a search bar and a list of builds from #47 to #52. The main area displays the 'Pipeline custom-haproxy-router' with a 'Recent Changes' icon and an 'add description' link. The 'Stage View' section shows a table of stage times for three builds. The top row shows average stage times, and the following rows show individual build times. Build #50 is highlighted in red, indicating a failure in the 'Test IP affinity' stage.

Pipeline custom-haproxy-router

[Recent Changes](#) [add description](#)

Stage View

Average stage times:

	Prepare environment	Clean	Build	Deploy	Test IP affinity	Test IP filtering	Test internet IP	Test intranet IP
Average stage times:	12s	2s	2s	2min 44s	16s	2min 14s	5s	1s
#52 Dec 16, 2016 15:06 1 commits	15s	2s	2s	3min 38s	25s	2min 12s	6s	1s
#51 Dec 16, 2016 13:45 No Changes	10s	2s	2s	2min 55s	39s	2min 16s	5s	1s
#50 Dec 16, 2016 12:24 1 commits	13s	2s	1s	2min 38s	1s			

Openshift: architecture

- Openshift Origin 1.3
 - Puppet-managed VMs + BYO Ansible playbook
- HA setup (masters and routers)
- Prod cluster: 5 large worker node VMs
 - sufficient for 33 Jenkins instances + CDA apps
- Integrated with CERN environment
 - Web Services/FIM: project lifecycle, DNS management
 - Authentication: SSO (SAML), LDAP, Kerberos
 - Storage: NFS, EOS, CVMFS

Openshift: integration

- Internal Python app to:
 - Implement Web Services API for project lifecycle and security (visibility, blocking...)
 - Customize autogeneration of DNS names on routes
 - Automate SSO (SAML) registration
 - Provision NFS volumes from the NFS Filer service
- Less customization needed as Openshift evolves
 - E.g. Volume classes in 1.4

Openshift: integration

- SDN: use IPSec to protect internal network traffic
- Kubernetes Flexvolume drivers for EOS, CVMFS (from cloud team)
- HAProxy routers:
 - IP affinity, IP filtering
 - Integration with DNS Load Balancing

Outlook

- Strategy: centralize web hosting on Openshift
 - Route all traffic for “central” web hosting via Openshift HAProxy routers
 - Move static/CGI web servers to containers
 - Including IIS when Windows containers possible
 - Containerize applications currently on VMs
 - Within CDA, and enable it for all CERN users

Questions?