

# Web application hosting with Openshift, and Docker images

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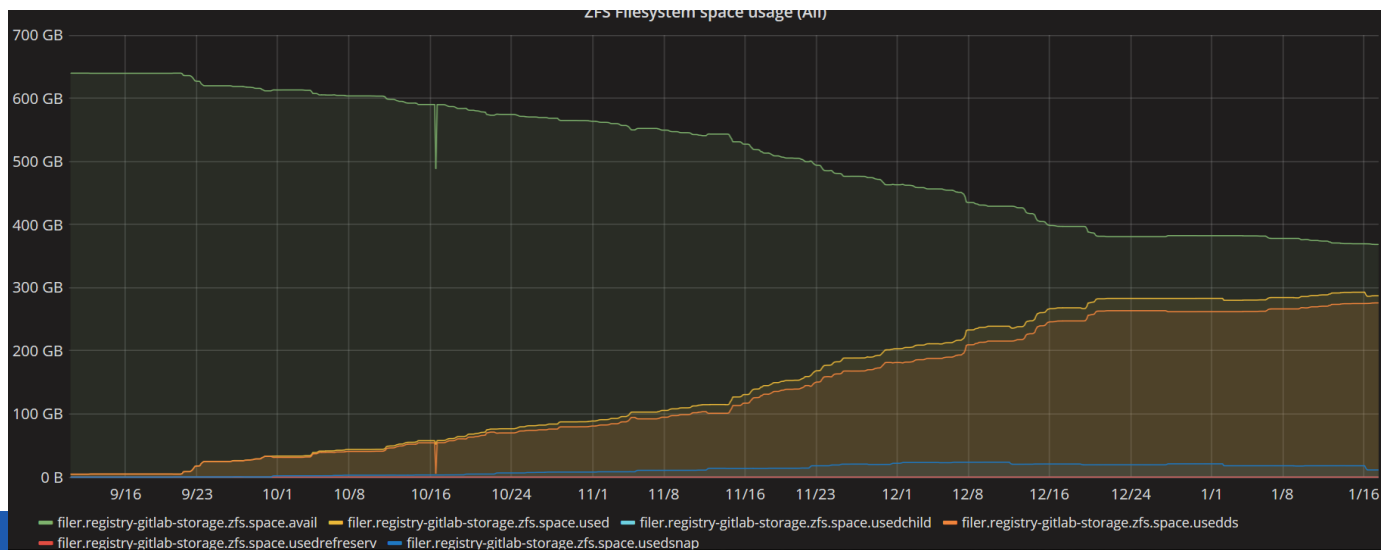


# Outline

- 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	<a href="#">[ Change ]</a>
Category	Test site	<a href="#">[ Change ]</a>
Owner	ALOSSENT (Alexandre Lossent - IT/CDA)   <a href="#">Account info</a>	<a href="#">[ Transfer ownership ]</a>
Site moderators	no site moderator	<a href="#">[ Manage moderators ]</a>
Registered on	25-May-2016 11:24	
Type	PaaS Web Application	
Status	Validated	
Expiration date	11-Apr-2017	<a href="#">[ Extend 3 months ]</a> <a href="#">[ Change ]</a>
Aliases (0)		<a href="#">[ Add alias ]</a>

**Authoring information**

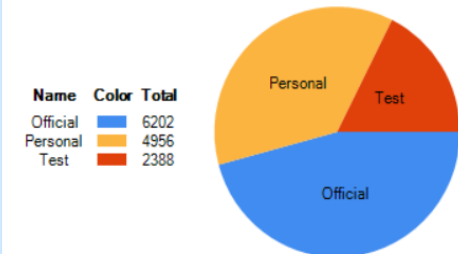
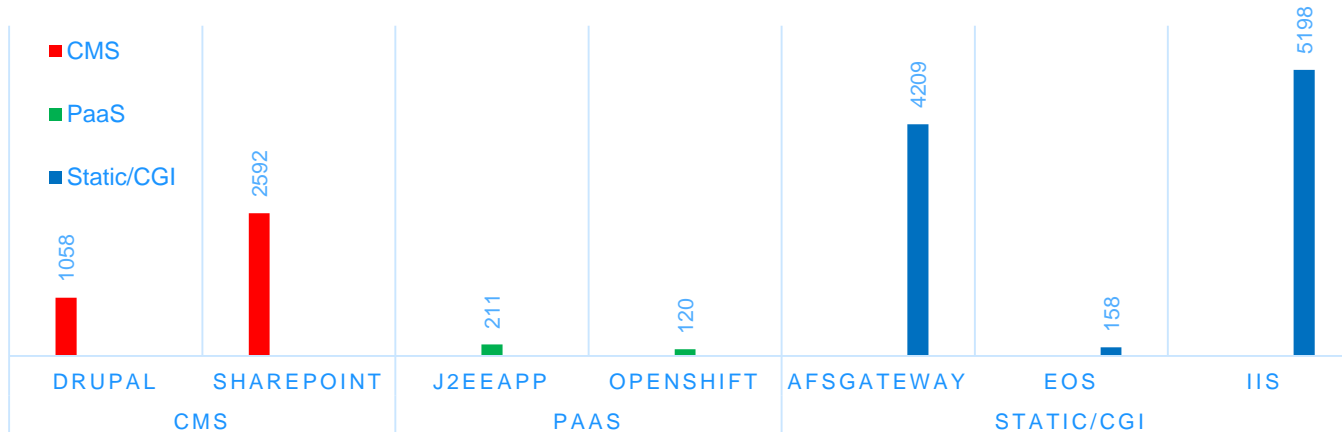
OpenShift sites are updated and managed through OpenShift portal. [More info...](#)

**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: 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

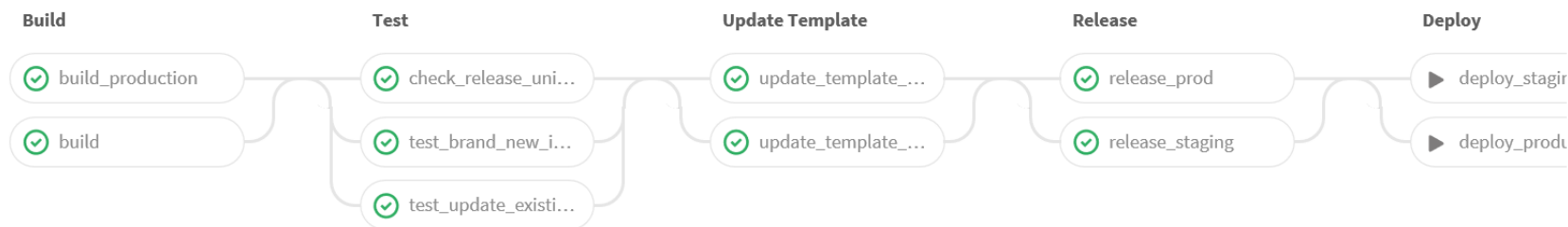


- Increase flexibility of central web hosting and support custom web apps without dedicated VMs



# 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 'Average stage times' row is: Prepare environment (12s), Clean (2s), Build (2s), Deploy (2min 44s), Test IP affinity (16s), Test IP filtering (2min 14s), Test internet IP (5s), Test intranet IP (1s). Build #52 (Dec 16, 15:06, 1 commit) has times: 15s, 2s, 2s, 3min 38s, 25s, 2min 12s, 6s, 1s. Build #51 (Dec 16, 13:45, No Changes) has times: 10s, 2s, 2s, 2min 55s, 39s, 2min 16s, 5s, 1s. Build #50 (Dec 16, 12:24, 1 commit) has times: 13s, 2s, 1s, 2min 38s, 1s (failed), and the remaining stages are greyed out.

	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 15:06 1 commits	15s	2s	2s	3min 38s	25s	2min 12s	6s	1s
#51 Dec 16 13:45 No Changes	10s	2s	2s	2min 55s	39s	2min 16s	5s	1s
#50 Dec 16 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?