



Jet Propulsion Laboratory
California Institute of Technology

ESGF CONTAINERS ARCHITECTURE

**ESGF F2F WORKSHOP
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The ESGF Containers Working Group

- * In August 2017, a new "ESGF Containers" working group was constituted to provide a unified strategy for evolving the current ESGF architecture into a container-based architecture
- * A “container” is a lightweight, standalone package that includes everything needed to run an application (the application, all dependencies, and “just-enough-OS”)
- * This working group builds on earlier containerization work supported by the DOE DREAM project, now co-funded by the EU Copernicus project
- * Initially targeting a deployment of Docker images via Docker Swarm onto a distributed computing cluster, later evaluating Kubernetes as alternative orchestration middleware

Micro-Services Architecture

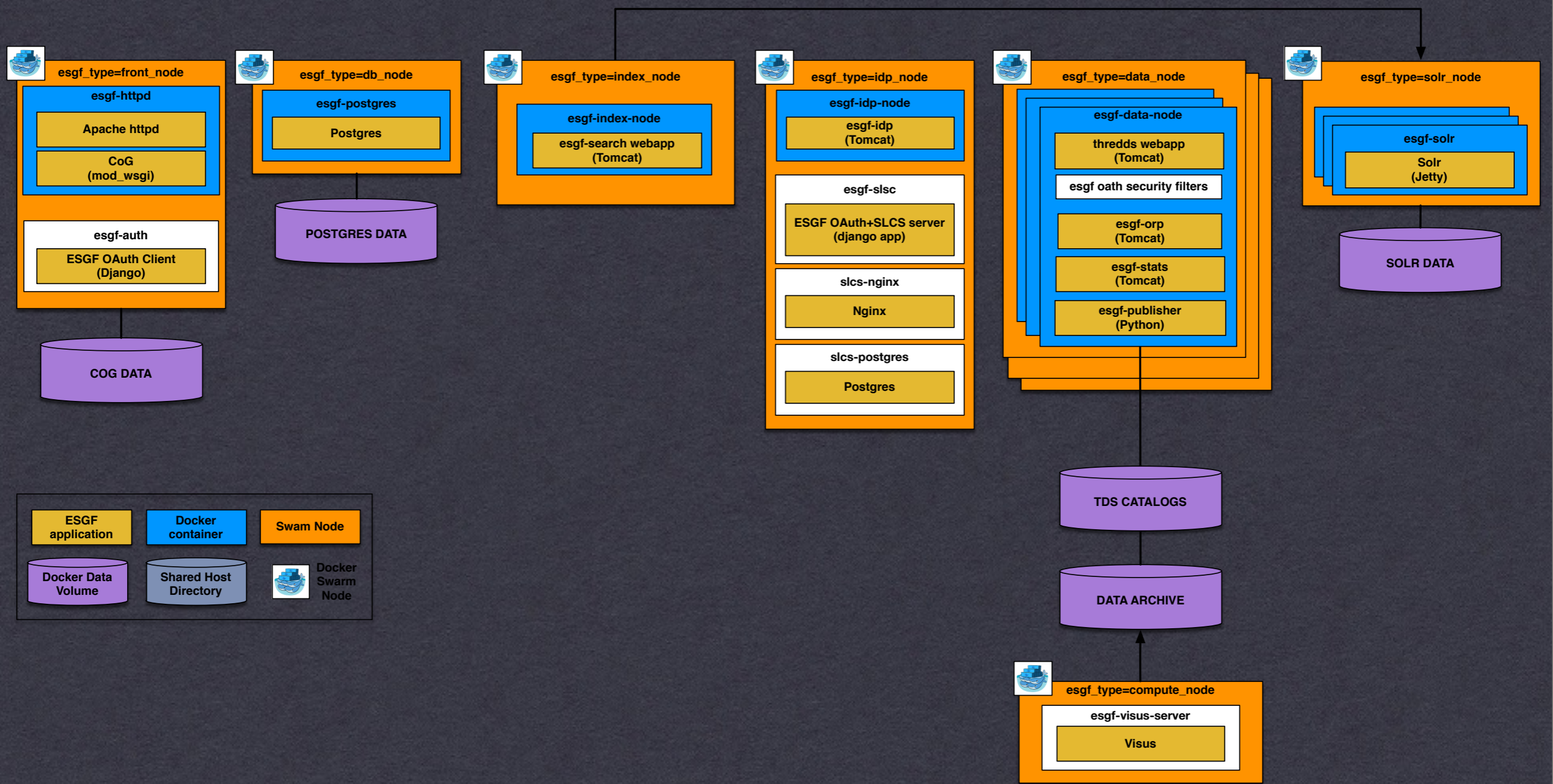
Advantages of container-based architecture (“Micro-Services”):

- * Easier to install and upgrade
- * Can upgrade separate images
- * Can roll back upgrades
- * Scalable onto multiple hosts
- * Deployable on laptop, internal cluster or Cloud
- * Easier to add new functionality as independent containers
- * Flexible deployments of services (as containers) onto distributed hosts

FY17 PROGRESS UPDATE

Currently working on ESGF/Docker version 1.4 which is *almost* a feature complete version of an ESGF Node:

- * User registration, authentication and access control
- * Data publishing, search and download
- * Includes new OAuth components: OAuth/SLCS server, ESGF-OAuth client (replacement for ORP), and TDS OAuth filter
- * Includes management of site configuration and sensitive information as Docker configs and secrets
- * Not well tested: Node Manager, Dashboard
- * Not yet included:
 - * Globus data transfer and download
 - * Live Access Server



ESGF DOCKER ARCHITECTURE V1.4-ALPHA

AS DEPLOYED WITH DOCKER STACK ON 6-NODE SWARM



● node1
manager
0.972G RAM

● node2
worker
0.972G RAM

● node3
worker
0.972G RAM

● node4
worker
0.972G RAM

● node5
worker
0.972G RAM

● node6
worker
0.972G RAM

esgf_type=fro...

esgf_type=db_...

esgf_type=ind...

esgf_type=idp...

esgf_type=dat...

esgf_type=solr...

● esgf-stack_esgf-cog

image : esgf-cog:1.2@sha256:048721...
tag : 1.2@sha256:048725d8a83139b...
cmd : my-node.esgf.org,true,false
updated : 11/8 7:59
ef73cb148f2381c67f575a7722eae5...
state : running

● esgf-stack_esgf-httpd

image : esgf-httpd:1.2@sha256:ab4f...
tag : 1.2@sha256:ab4be08f2a2318a...
updated : 11/8 7:59
864bdb91a23b214b2ca8f2bae93c5...
state : running

● esgf-stack_visualizer

image : visualizer:stable@sha256:bc...
tag : stable@sha256:bc680132f772d...
updated : 11/8 7:59
ec1b7d322bc9756b10615615fbc0e...
state : running

● esgf-stack_esgf-postgres

image : esgf-postgres:1.2@sha256:2...
tag : 1.2@sha256:26bf3e59f35297e...
updated : 11/8 7:59
ccea45949ead1a2d452f870409ea48...
state : running

● esgf-stack_esgf-index-node

image : esgf-index-node:1.2@sha256...
tag : 1.2@sha256:c08669e9b4a1073...
updated : 11/8 7:59
725cc3c38b448a6a7bb3b4a2a719aa...
state : running

● esgf-stack_slcs-postgres

image : postgres:latest@sha256:586...
tag : latest@sha256:586320aba4a40...
updated : 11/8 7:59
25ff3a1d0ab89b4d3e67b710b5b473...
state : running

● esgf-stack_esgf-slcs

image : esgf-slcs:1.2@sha256:c751c...
tag : 1.2@sha256:c751c4e62c31dcb...
cmd : -sn,my-node.esgf.org,-ds,root...
updated : 11/8 7:59
655548b-460f8eb5c050b20e25cd427...
state : running

● esgf-stack_slcs-nginx

image : nginx:latest@sha256:788fa2...
tag : latest@sha256:788fa27763db6...
updated : 11/8 7:59
3c79a3d20fa7d90e58cc134268fe81...
state : running

● esgf-stack_esgf-ldp-node

image : esgf-ldp-node:1.2@sha256:c...
tag : 1.2@sha256:d9af0a9670684f3...
updated : 11/8 7:59
7e583a8f242d3123afec87f9ce70c64...
state : running

● esgf-stack_esgf-data-node

image : esgf-data-node:1.2@sha256...
tag : 1.2@sha256:6742bc84f0c5e4e0...
updated : 11/8 7:59
cf8830ea9401f647aa911d10716e1f...
state : running

● esgf-stack_esgf-solr

image : esgf-solr:1.2@sha256:81aaa...
tag : 1.2@sha256:81aaaf4b81c7499...
updated : 11/8 7:59
622c07467cf5166734e0093f2c1771...
state : running

ESGF DOCKER ARCHITECTURE V1.4-ALPHA

AS VISUALIZED WITH DOCKER VISUALIZER

FY18 ROADMAP

- * Finish integration of current and new ESGF services, including:
 - * Globus
 - * Distributed server-side computing
 - * Visus
 - * Node Manager
 - * Dashboard
 - * LAS ?
- * Complete transition to OAuth authentication
- * Deploy ESGF/Docker test nodes at 2+ sites (JPL, IPSL, ...) by end of October 2017
- * Deploy ESGF/Docker test federation of 3+ sites by end of November 2017
- * Transition JPL operations to ESGF/Docker sometimes in 2018
- * Evaluate and possibly support deployment with Kubernetes
- * Investigate deployment via OpenShift

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DISCUSSION