# Dockerized Shibboleth, the Holy Grail?

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# The Mission

- Move a production web application to the cloud (AWS in particular)
- Employee best practice design and operations
  - CD/CI
  - Infrastructure as code
  - Cloud services whenever possible
- Poster child app for future move of entire portfolio to AWS

# The Application

- Infrastructure:
  - Apache
    - mod_jk: tomcat connector
    - mod_shib: Shibboleth Service Provider plugin
  - Tomcat
- Code:
  - Java
    - Spring MVC, Spring Security, Hibernate
- Execution environment:
  - Linux VM
  - Hosted at SDSC

# The Design

- Dockerize apache and tomcat
- Code pipeline
- Define as a CloudFormation template

# The Problem

- Getting mod_shib working an configured properly inside a docker container

# What is Docker?

- Packaging technology that allows OS, libraries, and application code to be layered together
- Container executes on any Docker engine
- Alleviates problems with environmental differences between systems, say, dev and prod
- Infrastructure includes repository to store containers, making them reusable
- All major open source projects have reference containers that you can start with, e.g. tomcat, nodejs, nginx, etc.

# What is Docker?

- Containers defined by a Dockerfile, which lists the starting container and all the layers you wish in include in your container
- You define networking, parameters, and startup scripts here as well

# What is Docker?

- Engine allows inter-container and container-outside networking
- This enables containers to be treated as building blocks
- Example: One container runs CDN app on Ruby on Rails, another Lucene as indexing against content

# What is Docker?

```
FROM debian:stretch-slim
LABEL maintainer="NGINX Docker Maintainers <docker-maint@nginx.com>"
ENV NGINX_VERSION   1.17.1
ENV NJS_VERSION     0.3.3
ENV PKG_RELEASE     1~stretch

# forward request and error logs to docker log collector
RUN ln -sf /dev/stdout /var/log/nginx/access.log \
    && ln -sf /dev/stderr /var/log/nginx/error.log
EXPOSE 80
STOPSIGNAL SIGTERM
CMD ["nginx", "-g", "daemon off;"]
```

# AWS Docker Services

- Elastic Container Repository (ECR)
- Elastic Container Service (ECS)
  - Entails running a full EC2 instance
- Fargate
  - ECS as a service
    - No visible EC2 instances
    - Lower cost
    - Application more opaque

# What is Shibboleth?

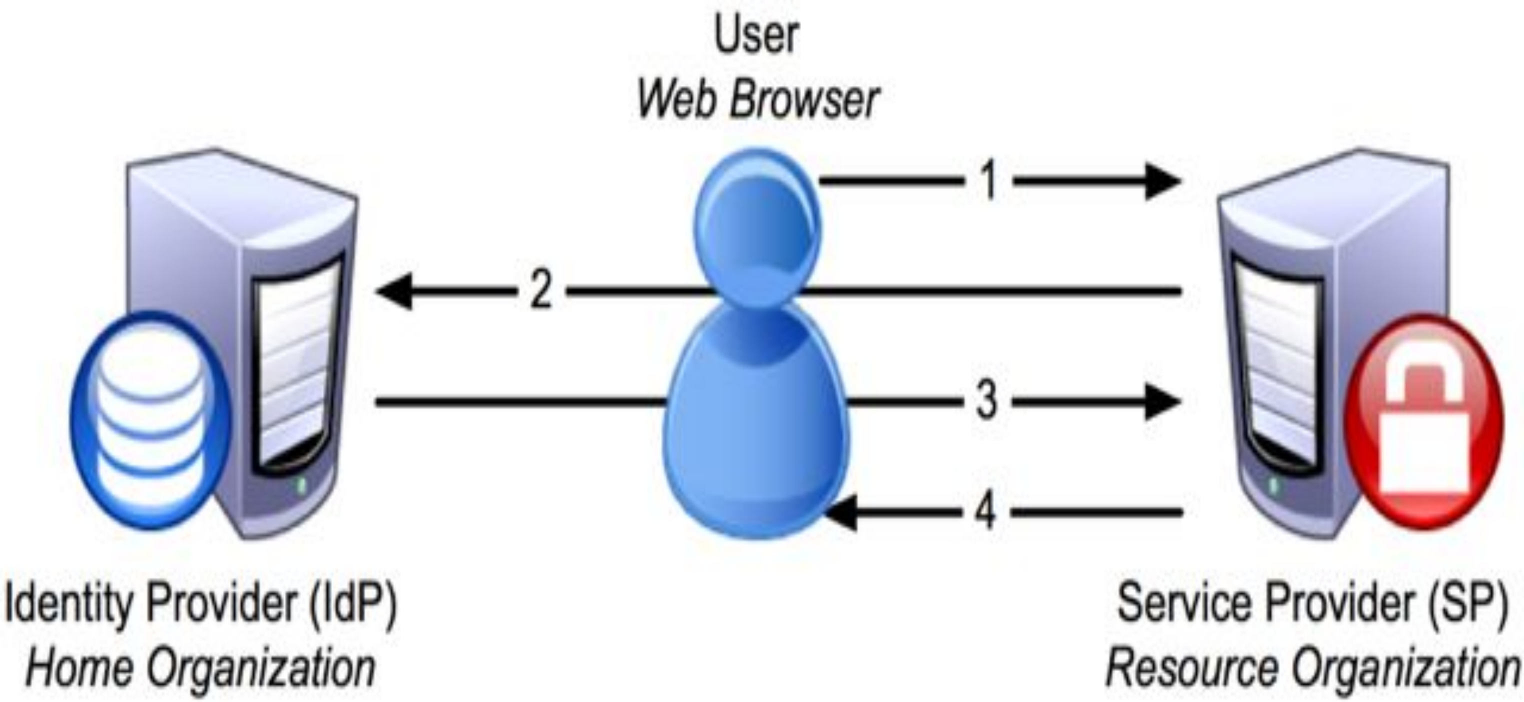
- is any custom or tradition, a phrasing that distinguishes one group of people from another. Shibboleths have been used throughout history in many societies as passwords, simple ways of self-identification, signaling loyalty and affinity, maintaining traditional segregation, or protecting from real or perceived threats.

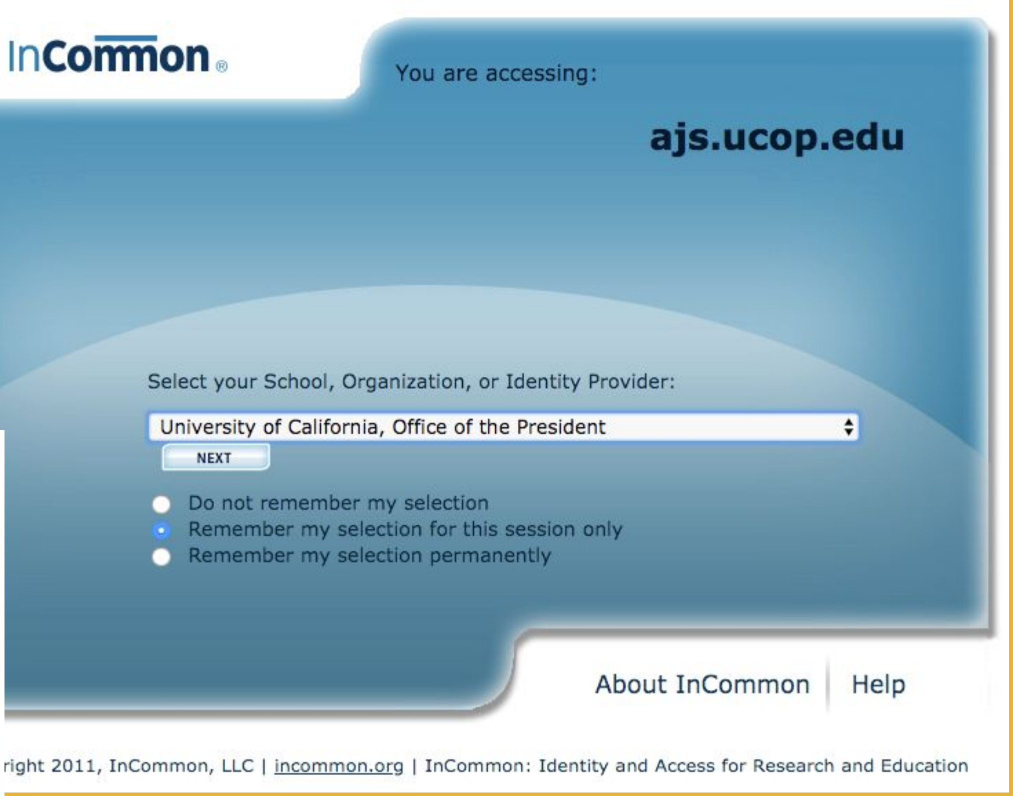
- The modern use derives from an account in the Hebrew Bible, in which pronunciation of this word was used to distinguish Ephraimites, whose dialect used a differently sounding first consonant.

# Shibboleth Single Sign-on and Federating Software

Shibboleth is an open-source project that provides Single Sign-On capabilities and allows sites to make informed authorization decisions for individual access of protected online resources in a privacy-preserving manner.

InCommon operates the identity management federation for U.S. research and education. Through InCommon, Identity Providers can give their users single sign-on convenience and privacy protection, while online Service Providers control access to their protected resources.





You are accessing:

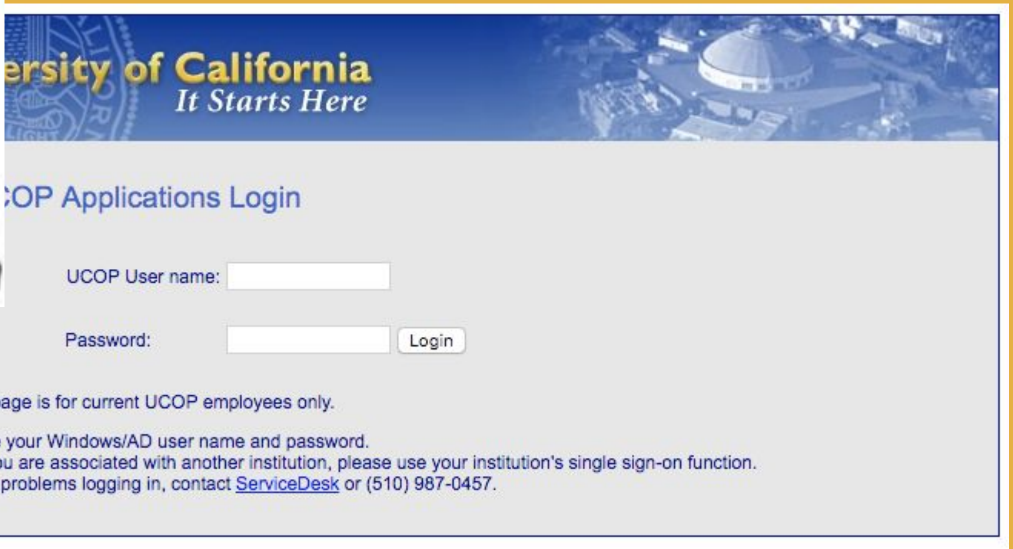
**ajs.ucop.edu**

Select your School, Organization, or Identity Provider:

University of California, Office of the President

- ○ Do not remember my selection
- ● Remember my selection for this session only
- ○ Remember my selection permanently

right 2011, InCommon, LLC | incommon.org | InCommon: Identity and Access for Research and Education



COP Applications Login

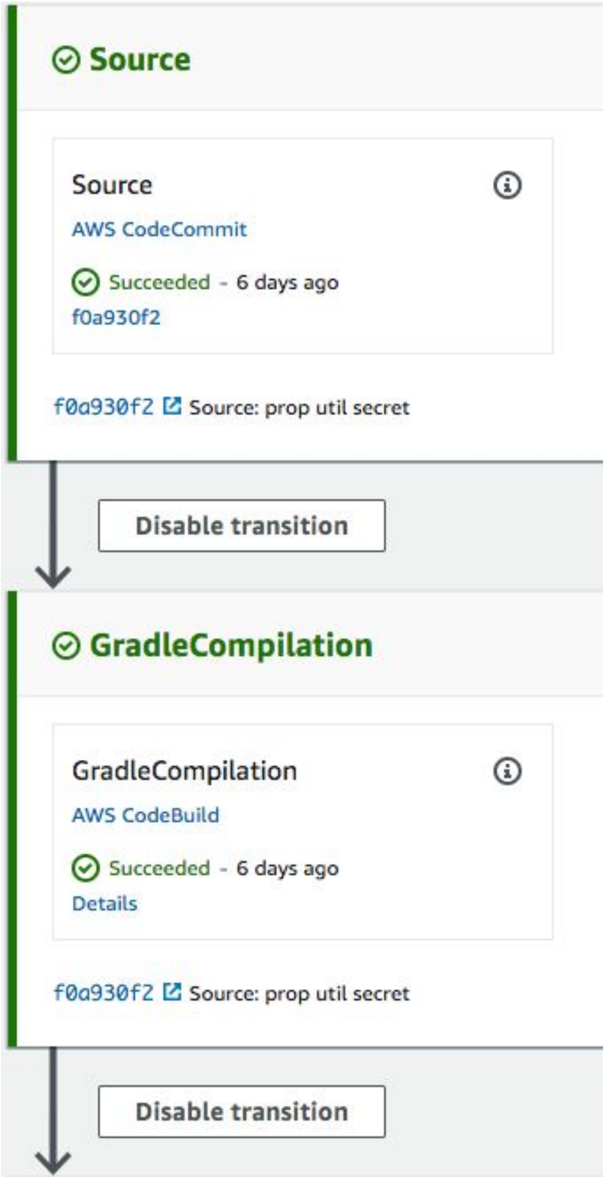
UCOP User name:

Password:

This login page is for current UCOP employees only.

- Use your Windows/AD user name and password.
- If you are associated with another institution, please use your institution's single sign-on function.
- For problems logging in, contact ServiceDesk or (510) 987-0457.

# AWS CODEPIPELINE



Source

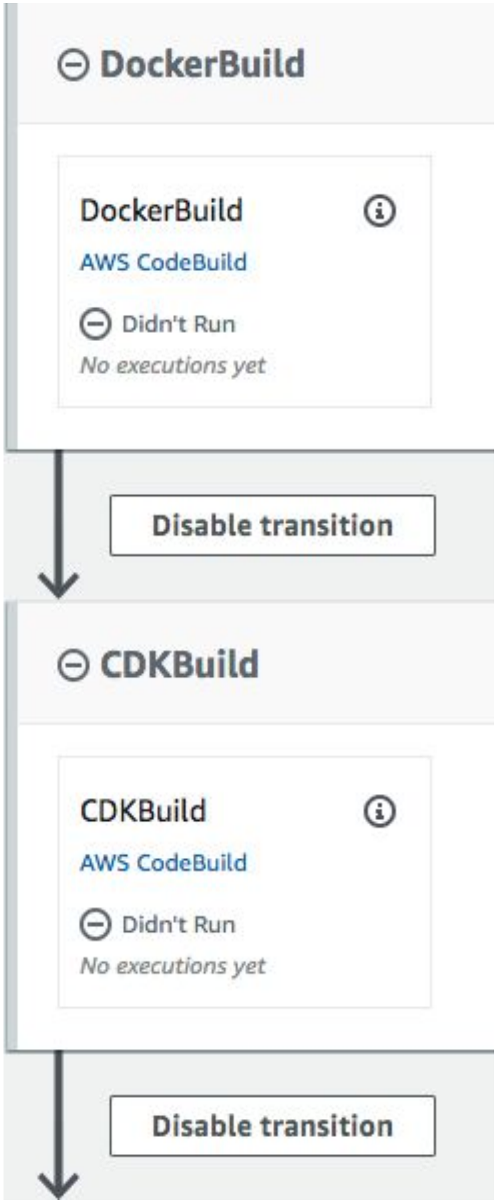
Source
AWS CodeCommit
Succeeded - 6 days ago
f0a930f2

f0a930f2 Source: prop util secret

GradleCompilation

GradleCompilation
AWS CodeBuild
Succeeded - 6 days ago
Details

f0a930f2 Source: prop util secret

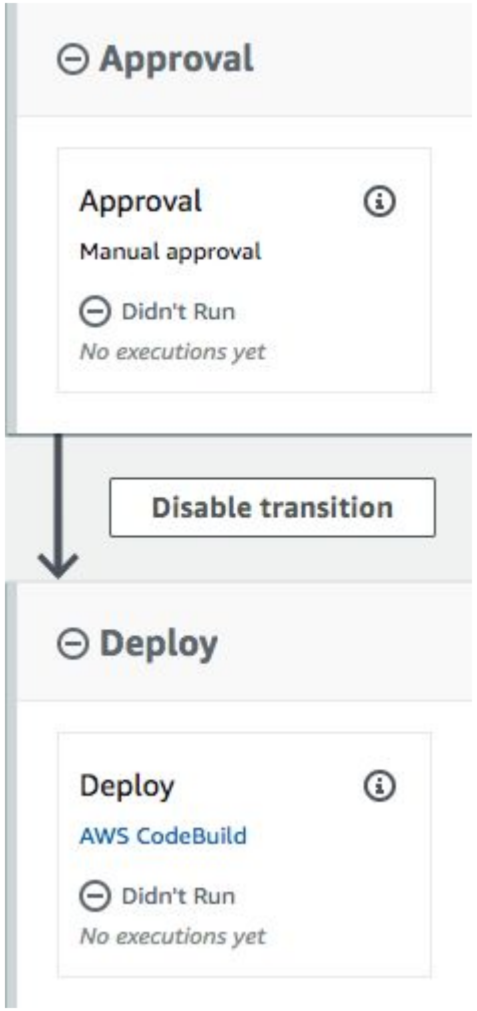


DockerBuild

DockerBuild
AWS CodeBuild
Didn't Run
*No executions yet*

CDKBuild

CDKBuild
AWS CodeBuild
Didn't Run
*No executions yet*



Approval

Approval
Manual approval
Didn't Run
*No executions yet*

Deploy

Deploy
AWS CodeBuild
Didn't Run
*No executions yet*

# AWS Services

## DOCKER

- ECR
- ECS
- FarGate
- Auto Scale

## CI/CD

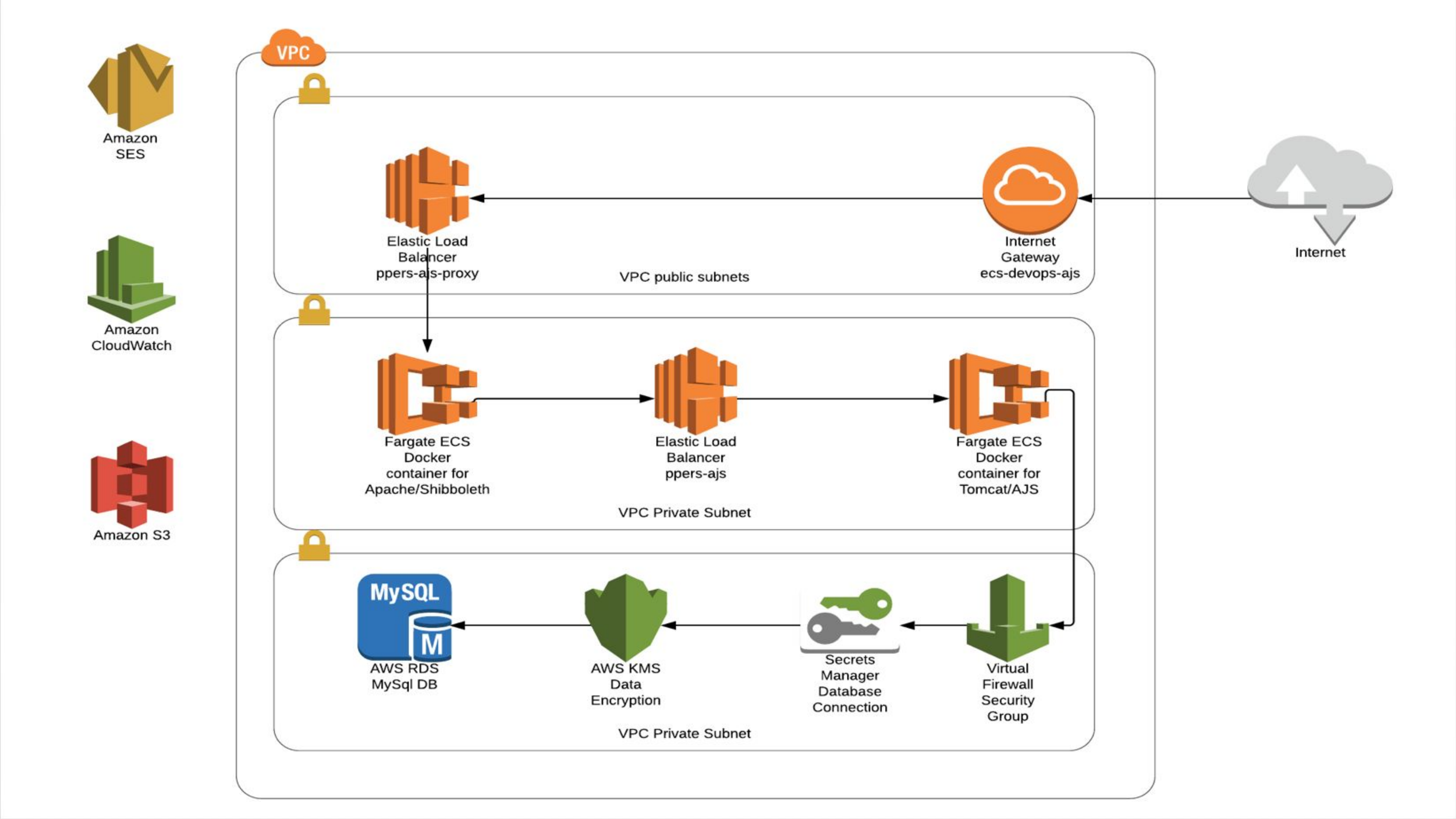
- CloudFormation
- CodeCommit
- CodePipeline
- CodeBuild
- Cloud9

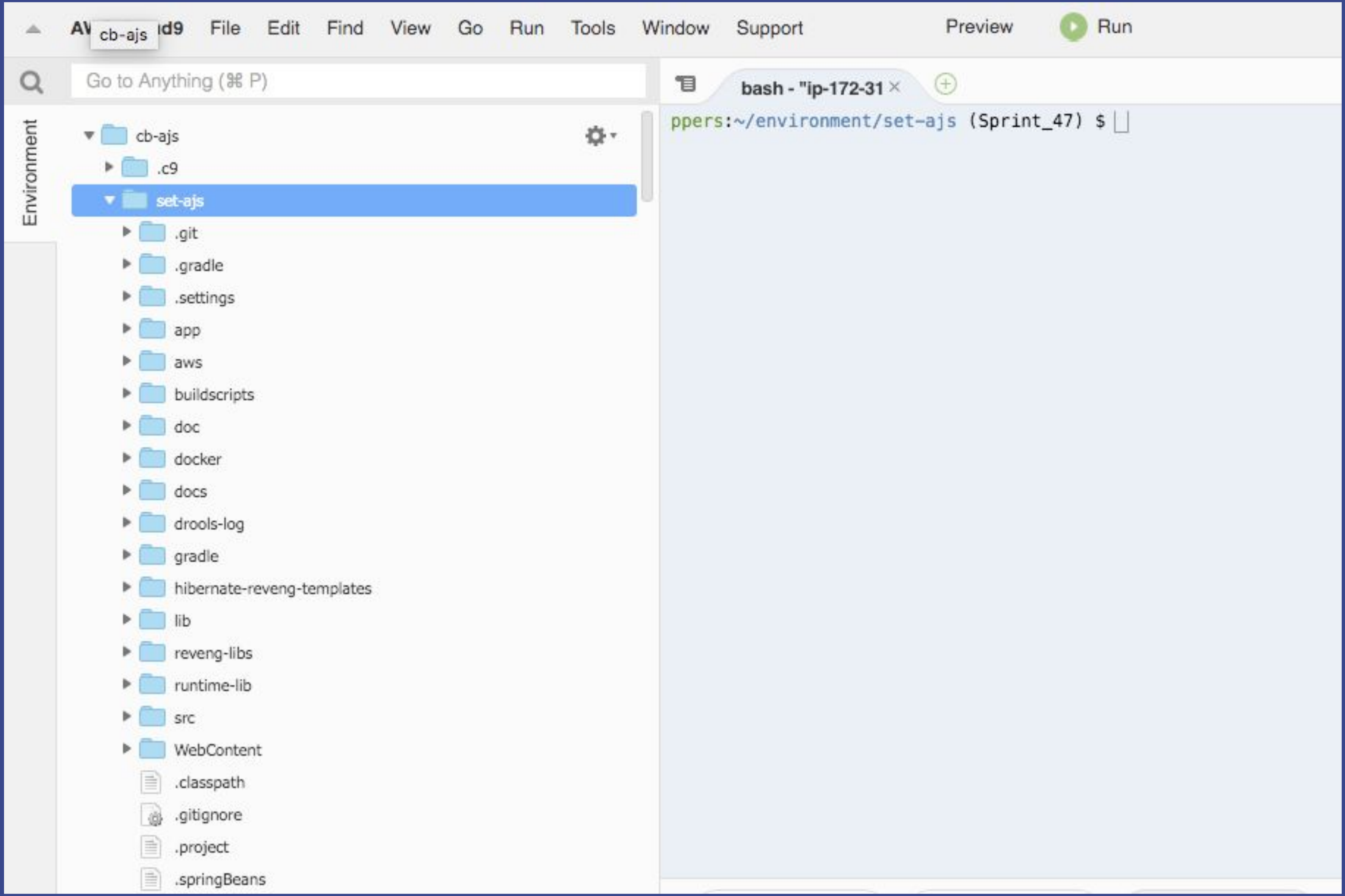
## Infrastructure

- Route53
- Elastic Load Balancers
- RDS
- Secrets Manager
- Lambda
- Network
- CloudWatch
- S3
- Certificate Manager
- SES

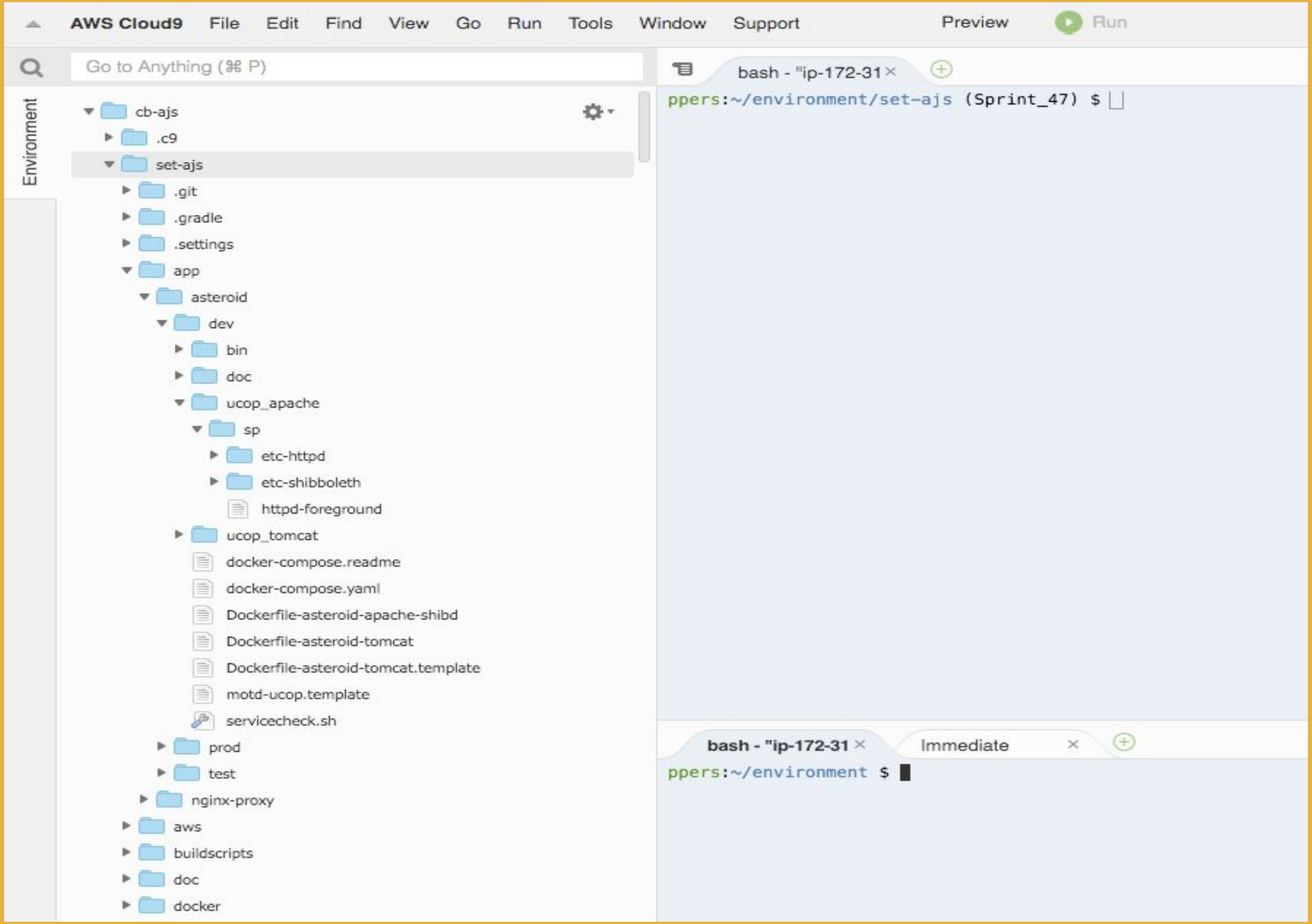
## Security

- IAM
- Config
- CloudTrail
- GuardDuty
- Billing and Cost


Amazon SES
Amazon CloudWatch
Amazon S3
VPC
Elastic Load Balancer ppers-ajs-proxy
Internet Gateway ecs-devops-ajs
Internet
VPC public subnets
Fargate ECS Docker container for Apache/Shibboleth
Elastic Load Balancer ppers-ajs
Fargate ECS Docker container for Tomcat/AJS
VPC Private Subnet
MySQL
M
AWS RDS MySql DB
AWS KMS Data Encryption
Secrets Manager Database Connection
Virtual Firewall Security Group
VPC Private Subnet



```
ppers:~/environment/set-ajs (Sprint_47) $ 
```



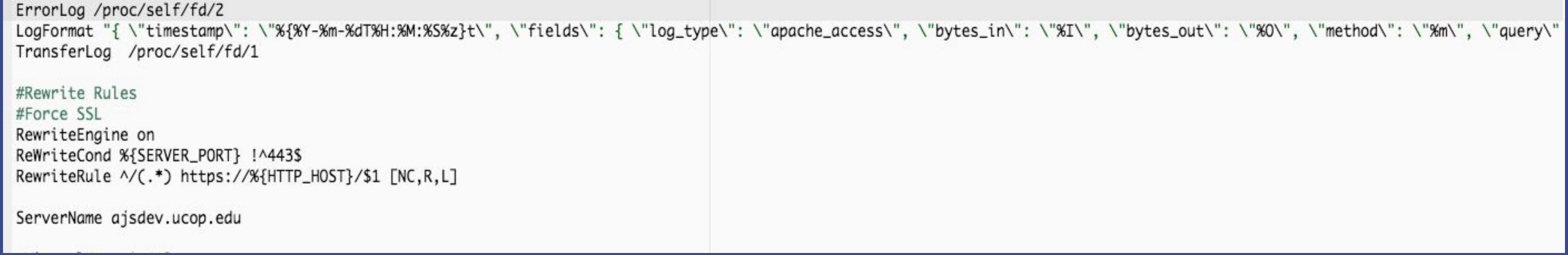
```
cb-ajs
  .c9
  set-ajs
    .git
    .gradle
    .settings
    app
      asteroid
        dev
          bin
          doc
          ucop_apache
            sp
              etc-httpd
              etc-shibboleth
              httpd-foreground
          ucop_tomcat
          docker-compose.readme
          docker-compose.yaml
          Dockerfile-asteroid-apache-shibd
          Dockerfile-asteroid-tomcat
          Dockerfile-asteroid-tomcat.template
          motd-ucop.template
          servicecheck.sh
        prod
        test
      nginx-proxy
    aws
    buildscripts
    doc
    docker
```

```
ppers:~/environment/set-ajs (Sprint_47) $
```

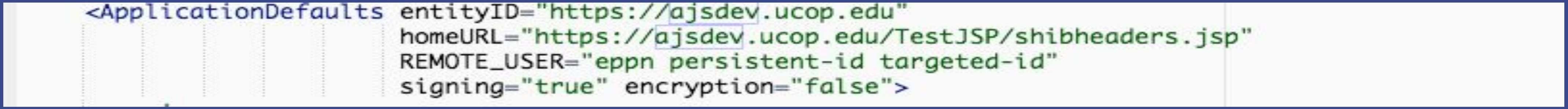
```
ppers:~/environment $
```

# SP is Service Provider is our app shib configuration
# IdP is campus identity provider
# InCommon is the metadata broker/coordinator

1. For different env/app, rename all ajsdev to ajsqa (dns entries) in:
   - sp/etc-httpd/conf.d/sp.conf
   - sp/etc-shibboleth/shibboleth2.xml

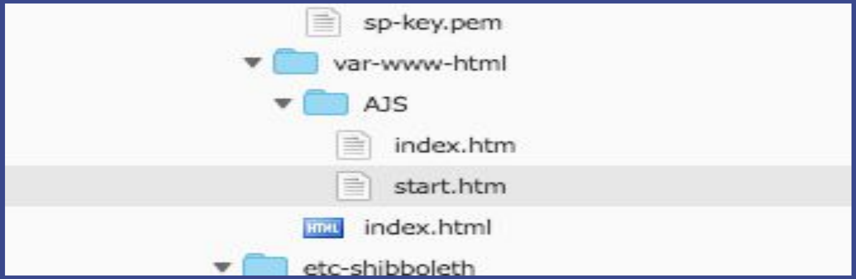


```
ErrorLog /proc/self/fd/2
LogFormat "{ \"timestamp\": \"%{%Y-%m-%dT%H:%M:%S%z}t\", \"fields\": { \"log_type\": \"apache_access\", \"bytes_in\": \"%I\", \"bytes_out\": \"%O\", \"method\": \"%m\", \"query\"
TransferLog  /proc/self/fd/1

#Rewrite Rules
#Force SSL
RewriteEngine on
ReWriteCond %{SERVER_PORT} !^443$
RewriteRule ^/(.*) https://%{HTTP_HOST}/$1 [NC,R,L]

ServerName ajsdev.ucop.edu
```



```
    <ApplicationDefaults entityID="https://ajsdev.ucop.edu"
                         homeURL="https://ajsdev.ucop.edu/TestJSP/shibheaders.jsp"
                         REMOTE_USER="eppn persistent-id targeted-id"
                         signing="true" encryption="false">
```

2. Change main pages in sp/etc-httpd/var-www-html

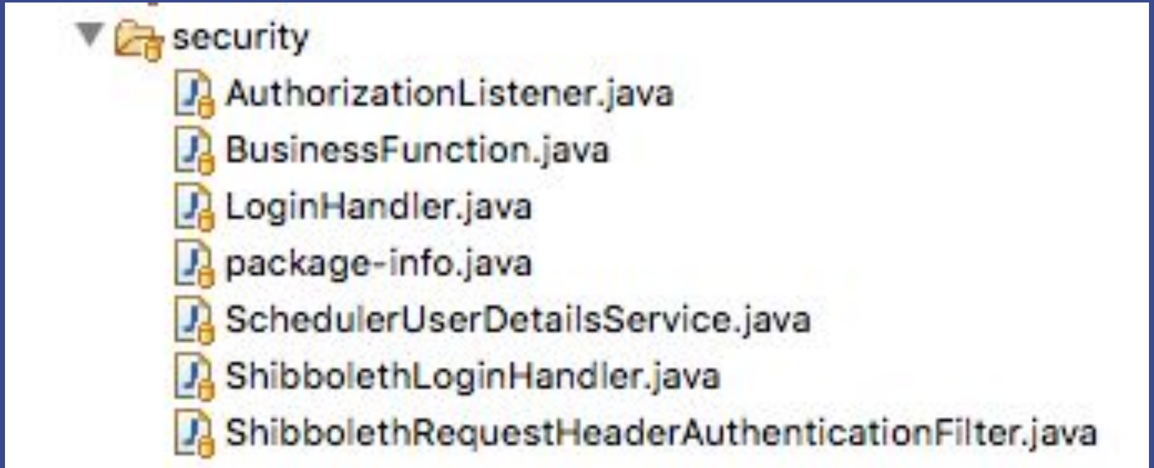


```
    sp-key.pem
  var-www-html
    AJS
      index.htm
      start.htm
    index.html
etc-shibboleth
```

3. Attributes in attributes.xml - request from your campus IdP to release specified attributes you need.  For example, Shib-emailAddr, Shib-eppn, Shib-displayName that you will check for and use in your application.

4. Create Shibboleth ssl certificate by doing:
   sudo /etc/shibboleth/keygen.sh -f -h ajs.ucop.edu -e https://ajs.ucop.edu/shibboleth -o /etc/shibboleth -u shibd -g shibd

5. Modify your application to check the https header for the attributes you need.



```
▼ security
    AuthorizationListener.java
    BusinessFunction.java
    LoginHandler.java
    package-info.java
    SchedulerUserDetailsService.java
    ShibbolethLoginHandler.java
    ShibbolethRequestHeaderAuthenticationFilter.java
```

- Shibboleth RequestHeaderAuthenticationFilter
  Handles for Shibboleth request headers to create Authorization ids.
- ShibbolethLoginHandler
  Interface for pre-login handling. These events occur after the Id is found, and before UserManager attempts a login of the user.
- LoginHandler
  Handles creation and updating of user account details when authenticating a user.

# Dockerfile-asteroid-apache-shibd:

```
FROM centos:centos7
MAINTAINER Carol Brothers
RUN yum -y update \
&& yum -y install wget \
&& wget http://download.opensuse.org/repositories/security://shibboleth/CentOS_7/security:shibboleth.repo -P
/etc/yum.repos.d \
&& yum -y install httpd mod_ssl shibboleth \
&& yum -y clean all
COPY ucop_apache/sp/etc-shibboleth /etc/shibboleth/
COPY ucop_apache/sp/etc-httpd/ /etc/httpd/
COPY ucop_apache/sp/etc-httpd/var-www-html/ /var/www/html/
COPY ucop_apache/sp/httpd-foreground /usr/local/bin/
RUN chown shibd.shibd /etc/shibboleth/sp-cert.pem
RUN chown shibd.shibd /etc/shibboleth/sp-key.pem
RUN chown shibd.shibd /etc/shibboleth
RUN chmod 600 /etc/shibboleth/sp-key.pem
RUN chmod 644 /etc/shibboleth/sp-cert.pem
RUN test -d /var/run/lock || mkdir -p /var/run/lock \
&& test -d /var/lock/subsys/ || mkdir -p /var/lock/subsys/ \
&& chmod +x /etc/shibboleth/shibd-redhat \
&& echo $'export LD_LIBRARY_PATH=/opt/shibboleth/lib64:$LD_LIBRARY_PATH\n'\
> /etc/sysconfig/shibd \
&& chmod +x /etc/sysconfig/shibd /etc/shibboleth/shibd-redhat /usr/local/bin/httpd-foreground
RUN echo "SELINUX=disabled" > /etc/selinux/config
EXPOSE 443
CMD ["httpd-foreground"]
```

# httpd-foreground

```
#!/bin/bash

# Apache and Shibd gets grumpy about PID files pre-existing from previous runs
rm -f /etc/httpd/run/httpd.pid /var/lock/subsys/shibd

# Start Shibd
/etc/shibboleth/shibd-redhat start

# Start httpd
exec httpd -DFOREGROUND
```

# QUESTIONS?

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