Advanced Jenkins Workshop - Remote API and Groovy

Anton Weiss,
Otomato

Jenkins CI - the Basics

- Get some code from VCS
  - Setup hooks/polling/scheduling
- Run maven/make/gradle/msbuild/grunt/gulp…
  - Unit tests?
- Deploy build products (Artifactory/S3/network)
- Provision testing environment(s)
- Run integration tests

Jenkins CI - the Basics

- Manual job creation/editing
- Basic parameters
- Plugins provide most of the functionality
- Statically defined presentation/notifications

Jenkins CI - beyond the Basics

- Integrate with External Tools
- Aggregate and process build/release data
- Implement smart triggering
- Create dashboards
- Automate job creation/management

Jenkins Remote API

- Remote API overview.
- XML API
- JSON API
- Automate Jobs creation

Jenkins Remote API

- What can you do?
  - Retrieve information.
  - Trigger jobs.
  - Copy/Create jobs
- XML, JSON or Python

Jenkins Remote API

- Authenticating:
  - **API Token : http://<jenkins_url>/user/<username>/configure**
- With CSRF Protection enabled:
  - Get the crumb:

```
wget -q --auth-no-challenge --http-user <user> --http-password <token> --output-document - ‘http://jenkins:8080/crumbIssuer/api/xml?xpath=concat(//crumbRequestField,”:”,//crumb)'
```

results in:

```
> Jenkins-Crumb:beae29bc2ca4d5539ba61d1afc410e96
```

now use with curl:

```
curl -H "Jenkins-Crumb:beae29bc2ca4d5539ba61d1afc410e96" -u "user:token" http://jenkins.otomato.link:8080/<endpoint>
```

Jenkins Remote API

- Submitting Jobs:
  - In job config: Build Triggers -> Trigger builds remotely (e.g., from scripts) -> Authentication Token
  - perform an HTTP POST on JENKINS_URL/job/JOBNAME/build?token=<TOKEN>

```
curl -X POST -H “Jenkins-Crumb:..” -u "user:token"
http://jenkins:8080/job/my_job/build?token=TOKEN
```

Jenkins Remote API

- Submitting Jobs with Parameters:

```
curl -X POST -H “Jenkins-Crumb:..” -u "user:token"
http://jenkins:8080/job/my_job/build \
  --data token=TOKEN \
  --data-urlencode json='{"parameter":
[{“name":"DEBUG_LEVEL", “value":"high"},
{"name":"OS", "value":"Ubuntu"}]}'
```

Exercise 1:

- Create a job with 2 parameters: STR (type string) & FLAG (type boolean)
- Build step: shell - print both parameters to stdout.
- Trigger the job remotely with values: “API” and “true”
- Question: what happens if we pass “on” as the value for FLAG?

XML API

- Access data exposed in HTML as XML for machine consumption.
- Use bash, perl, etc.
- Create custom reports and summaries.
- Basic description : http://your-jenkins:8080/api
- E.g:
  - http://jenkins.otomato.link:8080/job/myjob/api/xml - for job object
  - http://jenkins.otomato.link:8080/job/myjob/2/api/xml - for build object

XML API

- XPathselection with'xpath':
  - **http://jenkins.otomato.link:8080/job/myjob/api/xml?xpath=/*/displayName**
- XPathselectionwith'exclude':
  - **http://jenkins.otomato.link:8080/job/myjob/api/xml?exclude=/*/build**
- Depth control: (default depth = 0)
  - **http://jenkins.otomato.link:8080/api/xml?depth=1**

Exercise 2

- Retrieve an xml with only the ‘fullDisplayName’ for ‘lastStableBuild’ for any job on your jenkins instance.

XML API

- Limiting the amount of fetched data with ‘tree’:
  - **http://jenkins.otomato.link:8080/view/QA/api/xml?tree=jobs[name]**

Exercise 3

- Retrieve an xml with only the ‘fullDisplayName’ for ‘lastStableBuild’ for all the jobs on your jenkins instance.

Python API

```
import requests
url = 'http://jenkins.otomato.link:8080/api/python'
user, password = 'otomato', '3e31e507cea5355de93b28b1fc2d0877'
headers = {'Jenkins-Crumb':'beae29bc2ca4d5539ba61d1afc410e96'}
r = requests.get(url, headers=headers, auth=(user, password))
r.text
```

Remote API : Create a Job

- Use an existing jobs config.xml as a template
- Post an edited config.xml to http://jenkins_url/createItem?name=<JOB_NAME>
- Add "Content-Type: application/xml" header!

```
curl -X POST -H "Jenkins-Crumb:beae29bc2ca4d5539ba61d1afc410e96" -u
"otomato:3e31e507cea5355de93b28b1fc2d0877" -H "Content-Type:
application/xml" http://jenkins.otomato.link:8080/createItem?
name=new_job1 -d @config.xml
```

Exercise 4

- Use the config.xml of the job created in Exercise 1 as a template. Add a job description and a ‘shell’ build step to output current date.

- Create a new job with the name ‘date_job’ through remote API.

Copy a job

- To copy a job, send a POST request to http://jenkins_url/createItem with three query parameters: name=NEWJOBNAME&mode=copy&from=FROMJOBNAME

Additional Endpoints

- Build queue has its own separate API:

```
http://jenkins.otomato.link:8080/queue/api/json (xml/python)
```

- Overall load statistics of Jenkins has its own separate API.

```
http://jenkins.otomato.link:8080/overallLoad/api/xml
```

- Restarting Jenkins
- Enter the "quiet down" mode: ***http://jenkinsurl/quietDown***
- Cancel "quiet down" mode: ***http://jenkinsurl/cancelQuietDown***
- Restart Jenkins (if installed as a Windows service) : ***http://jenkinsurl/restart***
- Restart once no jobs are running: ***http://jenkinsurl/safeRestart***

Grooving with Jenkins

- Using Groovy to:
  - Perform Maintenance Tasks
  - Extend Functionality (instead of writing a full-fledged plugin)
  - Retrieve Information

The Groovy Language

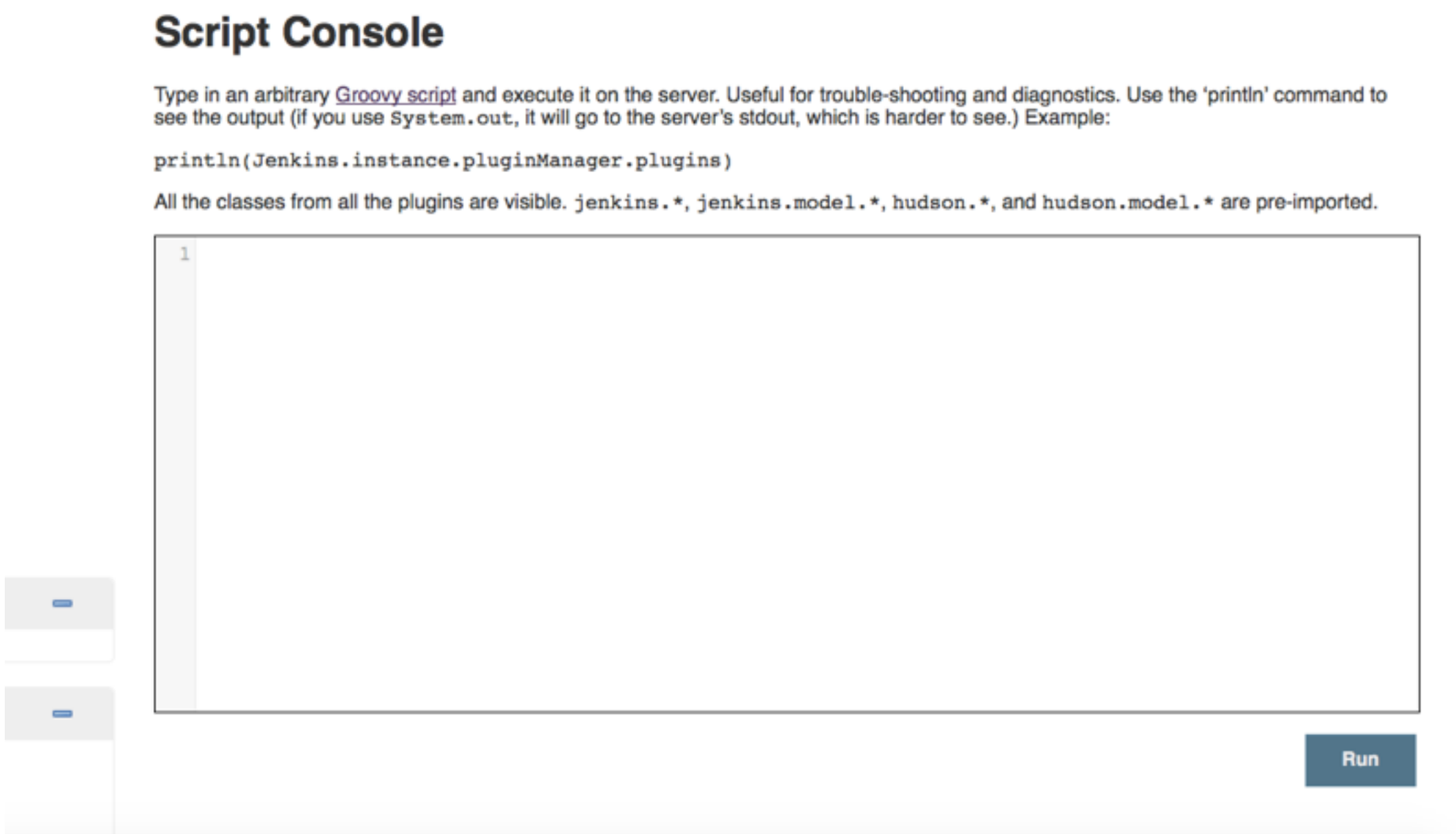
- Easy to learn and use
- Compiles to JVM bytecode
- Dynamic, optionally-typed
- Fully interoperates with Java
- Provides scripting capabilities
- Allows DSL authoring
- Meta-programming
- Functional programming

Hello Groovy World!

```
def sayHello(name) {
    println("Hello $name!")
}
def name = 'world'
sayHello(name)
```

Groovy Script Console

http://jenkinsurl/script



Groovy Script Console

```
//update git urls for all jobs
import jenkins.plugins.git.*
Jenkins.instance.items.each() { job ->
  def SCM = job.getScm()
  if(SCM instanceof GitSCM ) {
        def url = SCM.userRemoteConfigs[0].url
         println url
        new_url = url.replaceAll(/antweiss/, “otomato_gh")
        SCM.userRemoteConfigs[0].url = new_url
        job.save()
   }
}
```

Groovy Script Console

```
//reset your job build count

item = Jenkins.instance.getItemByFullName("your-job-name-
here")
//THIS WILL REMOVE ALL BUILD HISTORY
item.builds.each() { build ->
  build.delete()
}
item.updateNextBuildNumber(1)
```

Groovy Script Console

- Use ‘println’ to output values to the Web UI
- Use ***.dump()** function and ***instanceof*** for object reflection

Exercise

- Create a freestyle job “job-with-parms” with 2 string params
- Execute it a few times - each time with a different set of params
- Write a groovy console script to print out all the params.
- Hints:
  - use dump() to investigate the build object
  - use build.getActions and instances to find hudson.model.ParametersAction

Groovy Script Console

- No version control for scripts
- Requires manual editing to change values
  - Solution:
    - Jenkins Scriptler Plugin

https://wiki.jenkins-ci.org/display/JENKINS/Scriptler+Plugin

Groovy for Dynamic Parameters

- Retrieve parameter values dynamically:
  - from Jenkins itself
  - from external data sources:
    - e.g: SCM, DB, file system
- The script must return a java.util.List, an Array or a java.util.Map, as in the example below:

Groovy for Dynamic Parameters

- Retrieve a list of successful builds of a project:

```
job = Jenkins.instance.getItem("myjob")
def good_builds = []
job.getBuilds().each() { build ->
  if ( build.result.toString() == "SUCCESS")
  {
    good_builds.add(build.number)
  }
}
//return value is a list
good_builds
```

Groovy for Dynamic Parameters

- Use with:
  - Dynamic Parameter Plugin (+Scriptler)
  - Extended Choice Parameter Plugin
  - Extensible Choice Parameter Plugin
  - Active Choices Plugin - the most advanced functionality

Grooving with Build Steps!

[Jenkins Groovy Plugin]

- run regular groovy scripts
- run “system groovy scripts” :
  - inside Jenkins master JVM
  - schedule maintenance scripts
  - extend functionality:

```
build.setDescription(build.buildVariables.get('VERSION_NUM'))
```

Groovy Post-Build Plugin

- Provides ‘manager’ object
- Provides log parser methods:
  logContains(regexp)
  getLogMatcher(regexp) - returns a java.util.regex.Matcher
- Provides decorator methods:

```
manager.addShortText("$manager.getEnvVariable
('DD_VERSION')}")
```

Groovy Post-Build Plugin

```
def exit_status = manager.getEnvVariable("EXIT_FLAG")
def SETUP_NAME=manager.getEnvVariable("name")
switch (exit_status) {
  case "0":
    manager.buildSuccess()
    break
  case "9":
    manager.buildUnstable()
    manager.addBadge("delete.gif", "release setup", “http://my.server.com:8080/view/integration/job/drms-release-setup/parambuild/?name=$SETUP_NAME”)
    manager.createSummary("orange-square.png").appendText("<b>Setup name:</b> $SETUP_NAME", false, false, false, "grey")
    break
  default:
    manager.buildFailure()
}
```

Exercise

- Install Groovy Post-build plugin
- Write a script to set build to unstable if log contains the pattern : ‘** Warnings’ (where ** is a number)
- Use createSummary method to add an icon and some text to build page. Use ‘yellow.png’ as an icon.

Groovy with email-ext plugin

- Recipient List’ field:
  - ${SCRIPT, script=“upstream_committers.groovy”}
- For email templates:
  - ${SCRIPT, template="groovy-html1.template"}

upstream-committers.groovy

```groovy
def upstreamBuild = null
def committers = []

def cause = build.causes.find() { it instance hudson.model.Cause.UpstreamCause }
try {
        //recursively get to the top-most originating build
   while(cause != null) {

        upstreamBuild =
hudson.model.Hudson.instance.getItem(cause.upstreamProject).getBuildByNumber(cau
se.upstreamBuild)
        if(upstreamBuild == null) {
                        break;
                }

        //add all upstream build comitters to the recipient list

         if(upstreamBuild.changeSet != null) {
              upstreamBuild.changeSet.each() { cs ->
                        if(cs.user != null) {
                                committers.add(cs.user)
                            }
                    }
                }
                cause = upstreamBuild.causes.find() {it instance
                    hudson.model.Cause.UpstreamCause }

        }
} catch(e) {
    // do nothing
}
committers.unique().join(',')
```

Thank you!