1. **Prerequisites:**
- Vagrant (tested on 1.6.5)
- Virtualbox (tested on 4.3.18_Debianr96516)
- Ansible (tested on 1.7.2)

2. **Source files:**
```
nagios/check_tomcatSessions
nagios/hostgroups_nagios2.cfg
nagios/htpasswd.users
nagios/services_nagios2.cfg
nagios/tomcat.cfg
tomcat/odata.war
tomcat/tomcat-proxypass
tomcat/tomcat-users.xml
index.php
playbook.yml
Vagrantfile
```

3. **Setup description:**
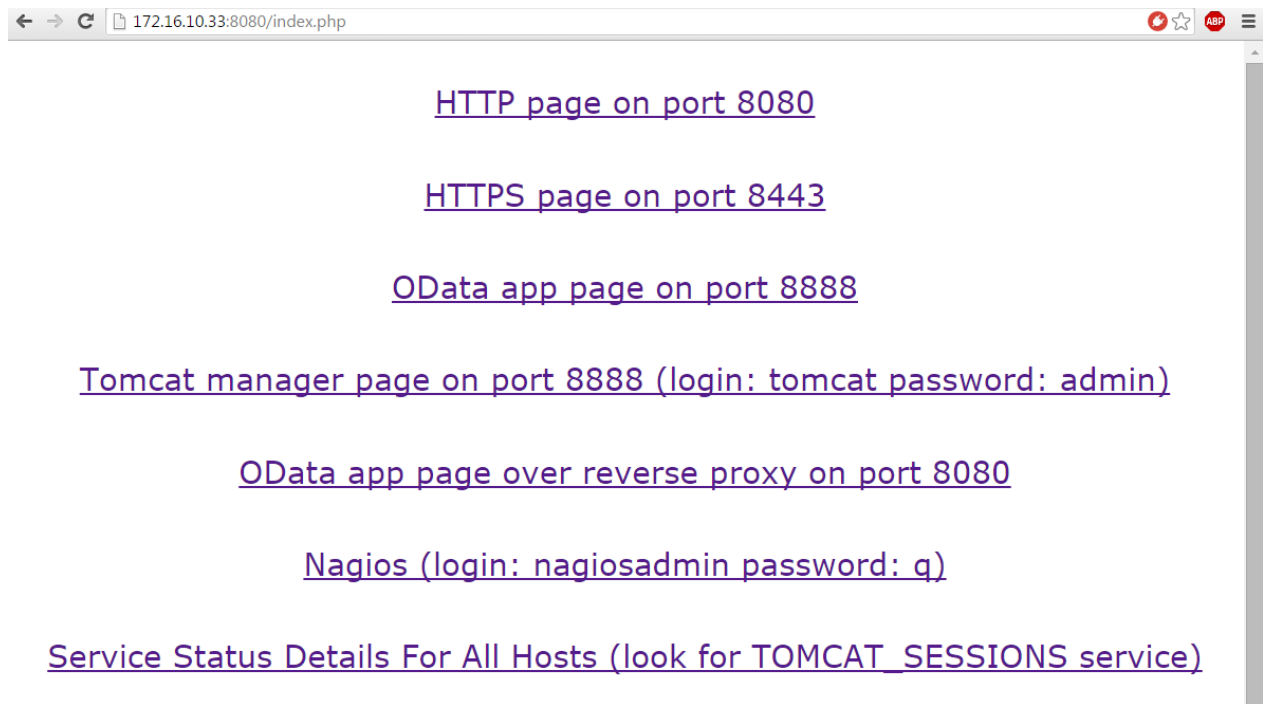3.1. Start VM using http://files.vagrantup.com/precise32.box image (Ubuntu 12.04 LTS)
3.2. Forward Apache & Tomcat ports
3.3. Use Ansible to provision VM according to requirements. Error handling included.
   a) Setup correct timezone
   b) Install & configure Apache (SSL + reverse proxy)
   c) Install & configure Tomcat + Web Application Manager
   d) Install & configure Nagios + custom Tomcat sessions script
   e) Deploy Apache Olingo OData 4.0 Sample Service on Tomcat

4. **Links:**

All necessary links and credentials are available under http://<host_ip>:8080/index.php, i.e.:

```
← → C   🗋 172.16.10.33:8080/index.php                                          ◑ ☆  ABP  ≡
```

<u>HTTP page on port 8080</u>

<u>HTTPS page on port 8443</u>

<u>OData app page on port 8888</u>

<u>Tomcat manager page on port 8888 (login: tomcat password: admin)</u>

<u>OData app page over reverse proxy on port 8080</u>

<u>Nagios (login: nagiosadmin password: q)</u>

<u>Service Status Details For All Hosts (look for TOMCAT_SESSIONS service)</u>

HTTP page on port 8080 http://<host_ip>:8080

HTTPS page on port 8443 https://<host_ip>:8443

OData app page on port 8888 http://<host_ip>:8888/odata

Tomcat manager page on port 8888 (login: tomcat password: admin)
http://<host_ip>:8888/manager/html

OData app page over reverse proxy on port 8080 http://<host_ip>:8080/tomcat/odata

Nagios (login: nagiosadmin password: q) http://<host_ip>:8080/nagios3

Service Status Details For All Hosts (look for TOMCAT_SESSIONS service) http://<host_ip>:8080/cgi-bin/nagios3/status.cgi?host=all

5. **Stress test using ApacheBench:**
    5.1. Command for running simple stress test:

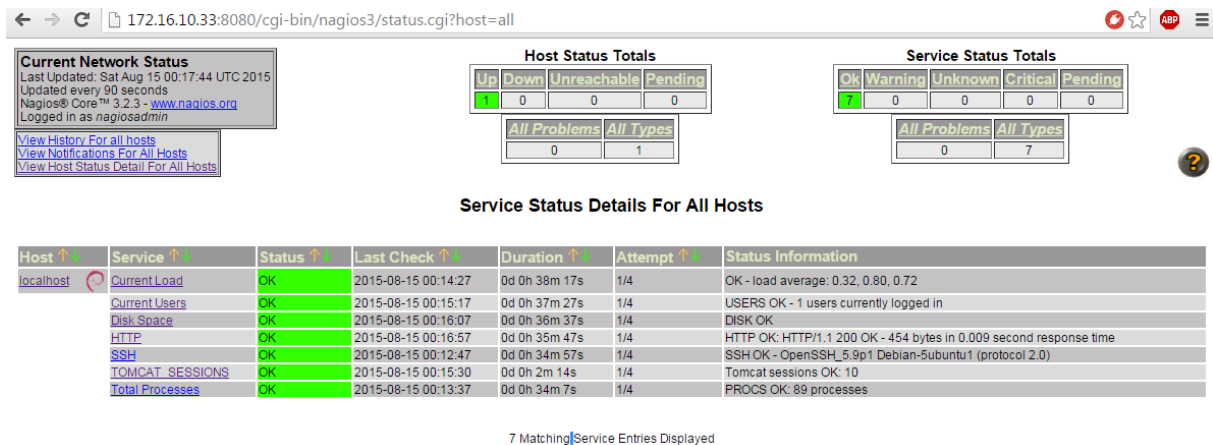ab -n 1000 -c 5 http://<host_ip>:8888/odata/ (from Vagrant host)
ab -n 1000 -c 5 http://localhost:8080/odata/ (from VM)

(after approx. 1 min. TOMCAT_SESSIONS count should grow and trigger the alarm)

Use 'Expire sessions' on Tomcat manager page to turn off the alarm.

    5.2. **Example stress test run:**
    5.2.1.   **Nagios console before starting the test:**

Current Network Status
Last Updated: Sat Aug 15 00:17:44 UTC 2015
Updated every 90 seconds
Nagios® Core™ 3.2.3 - www.nagios.org
Logged in as *nagiosadmin*

View History For all hosts
View Notifications For All Hosts
View Host Status Detail For All Hosts

Host Status Totals

Up	Down	Unreachable	Pending
1	0	0	0

All Problems	All Types
0	1

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
7	0	0	0	0

All Problems	All Types
0	7

Service Status Details For All Hosts

Host	Service	Status	Last Check	Duration	Attempt	Status Information
localhost	Current Load	OK	2015-08-15 00:14:27	0d 0h 38m 17s	1/4	OK - load average: 0.32, 0.80, 0.72
	Current Users	OK	2015-08-15 00:15:17	0d 0h 37m 27s	1/4	USERS OK - 1 users currently logged in
	Disk Space	OK	2015-08-15 00:16:07	0d 0h 36m 37s	1/4	DISK OK
	HTTP	OK	2015-08-15 00:16:57	0d 0h 35m 47s	1/4	HTTP OK: HTTP/1.1 200 OK - 454 bytes in 0.009 second response time
	SSH	OK	2015-08-15 00:12:47	0d 0h 34m 57s	1/4	SSH OK - OpenSSH_5.9p1 Debian-5ubuntu1 (protocol 2.0)
	TOMCAT_SESSIONS	OK	2015-08-15 00:15:30	0d 0h 2m 14s	1/4	Tomcat sessions OK: 10
	Total Processes	OK	2015-08-15 00:13:37	0d 0h 34m 7s	1/4	PROCS OK: 89 processes

7 Matching Service Entries Displayed

5.2.2. Running the stress test:

```
root@precise32:~# ab -n 1000 -c 5 http://localhost:8080/odata/
This is ApacheBench, Version 2.3 <$Revision: 655654 $>
Copyright 1996 Adam Twiss, Zeus Technology Ltd, http://www.zeustech.net/
Licensed to The Apache Software Foundation, http://www.apache.org/

Benchmarking localhost (be patient)
Completed 100 requests
Completed 200 requests
Completed 300 requests
Completed 400 requests
Completed 500 requests
Completed 600 requests
Completed 700 requests
Completed 800 requests
Completed 900 requests
Completed 1000 requests
Finished 1000 requests


Server Software:        Apache-Coyote/1.1
Server Hostname:        localhost
Server Port:            8080

Document Path:          /odata/
Document Length:        1679 bytes

Concurrency Level:      5
Time taken for tests:   5.477 seconds
Complete requests:      1000
Failed requests:        0
Write errors:           0
Total transferred:      1923000 bytes
HTML transferred:       1679000 bytes
Requests per second:    182.59 [#/sec] (mean)
Time per request:       27.384 [ms] (mean)
Time per request:       5.477 [ms] (mean, across all concurrent requests)
Transfer rate:          342.89 [Kbytes/sec] received

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:        1    6    4.7      6      30
Processing:     2   20   15.2     16     120
Waiting:        0   12   11.4      9      96
Total:          3   26   15.8     23     123

Percentage of the requests served within a certain time (ms)
  50%     23
```

```
        66%      28
        75%      32
        80%      36
        90%      46
        95%      57
        98%      74
        99%      92
       100%     123 (longest request)
```

5.2.3. Increase the number of sessions on Tomcat Web Console:

Tomcat Web Application Manager

Message:	OK

Manager			
List Applications	HTML Manager Help	Manager Help	Server Status

Applications					
Path	Version	Display Name	Running	Sessions	Commands
/	None specified		true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/host-manager	None specified	Tomcat Host Manager Application	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/manager	None specified	Tomcat Manager Application	true	8	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/odata	None specified	Apache Olingo OData 4.0 Sample Service	true	1,000	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes

5.2.4. Nagios console with the alarm triggered:

Current Network Status
Last Updated: Sat Aug 15 00:21:32 UTC 2015
Updated every 90 seconds
Nagios® Core™ 3.2.3 - www.nagios.org
Logged in as nagiosadmin

View History For all hosts
View Notifications For All Hosts
View Host Status Detail For All Hosts

Host Status Totals

Up	Down	Unreachable	Pending
1	0	0	0

All Problems	All Types
0	1

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
6	0	0	1	0

All Problems	All Types
1	7

Service Status Details For All Hosts

Host	Service	Status	Last Check	Duration	Attempt	Status Information
localhost	Current Load	OK	2015-08-15 00:19:27	0d 0h 42m 5s	1/4	OK - load average: 0.82, 0.73, 0.70
	Current Users	OK	2015-08-15 00:20:17	0d 0h 41m 15s	1/4	USERS OK - 1 users currently logged in
	Disk Space	OK	2015-08-15 00:21:07	0d 0h 40m 25s	1/4	DISK OK
	HTTP	OK	2015-08-15 00:16:57	0d 0h 39m 35s	1/4	HTTP OK: HTTP/1.1 200 OK - 454 bytes in 0.009 second response time
	SSH	OK	2015-08-15 00:17:47	0d 0h 38m 45s	1/4	SSH OK - OpenSSH_5.9p1 Debian-5ubuntu1 (protocol 2.0)
	TOMCAT_SESSIONS	CRITICAL	2015-08-15 00:20:30	0d 0h 1m 2s	1/4	Tomcat sessions CRITICAL: 1011
	Total Processes	OK	2015-08-15 00:18:37	0d 0h 37m 55s	1/4	PROCS OK: 89 processes

7 Matching Service Entries Displayed

Expected 'vagrant up' run:

```
# vagrant up

Bringing machine 'default' up with 'virtualbox' provider...

==> default: Importing base box 'precise32'...

==> default: Matching MAC address for NAT networking...

==> default: Setting the name of the VM: ansible-box_default_1439595019340_59968

==> default: Clearing any previously set network interfaces...

==> default: Preparing network interfaces based on configuration...

    default: Adapter 1: nat

    default: Adapter 2: bridged

==> default: Forwarding ports...

    default: 80 => 8080 (adapter 1)

    default: 443 => 8443 (adapter 1)

    default: 8080 => 8888 (adapter 1)

    default: 22 => 2222 (adapter 1)

==> default: Booting VM...

==> default: Waiting for machine to boot. This may take a few minutes...

    default: SSH address: 127.0.0.1:2222

    default: SSH username: vagrant

    default: SSH auth method: private key

    default: Warning: Connection timeout. Retrying...

    default: Warning: Connection timeout. Retrying...

    default: Warning: Connection timeout. Retrying...

==> default: Machine booted and ready!

==> default: Checking for guest additions in VM...

    default: The guest additions on this VM do not match the installed version of

    default: VirtualBox! In most cases this is fine, but in rare cases it can

    default: prevent things such as shared folders from working properly. If you see

    default: shared folder errors, please make sure the guest additions within the

    default: virtual machine match the version of VirtualBox you have installed on

    default: your host and reload your VM.

    default:

    default: Guest Additions Version: 4.2.0

    default: VirtualBox Version: 4.3

==> default: Configuring and enabling network interfaces...

==> default: Mounting shared folders...
```

```
    default: /vagrant => /root/ansible-box
==> default: Running provisioner: ansible...


PLAY [all] ***********************************************************


GATHERING FACTS *****************************************************
ok: [default]


TASK: [set timezone] ***********************************************
changed: [default]


TASK: [install apache] *********************************************
changed: [default]


TASK: [install tomcat] *********************************************
changed: [default]


TASK: [install tomcat-admin] ***************************************
changed: [default]


TASK: [copy tomcat users file] ************************************
changed: [default]


TASK: [add tomcat to rc.d] ****************************************
ok: [default]


TASK: [odata.war deploy] ******************************************
changed: [default]


TASK: [install php] ***********************************************
changed: [default]


TASK: [install nagios] ********************************************
changed: [default]


TASK: [copy nagios configuration 1] ******************************
changed: [default]
```

```
TASK: [copy nagios configuration 2] *****************************************
changed: [default]


TASK: [copy nagios configuration 3] *****************************************
changed: [default]


TASK: [copy nagios configuration 4] *****************************************
changed: [default]


TASK: [copy nagios configuration 5] *****************************************
changed: [default]


TASK: [copy proxypass config for apache] ************************************
changed: [default]


TASK: [copy index page] *****************************************************
changed: [default]


TASK: [enable ssl for apache] ***********************************************
changed: [default]


TASK: [enable proxy_http for apache] ****************************************
changed: [default]


TASK: [enable ssl vhost] ****************************************************
changed: [default]


TASK: [enable tomcat-proxypass] *********************************************
changed: [default]


NOTIFIED: [start apache2] ***************************************************
ok: [default]


NOTIFIED: [start tomcat7] ***************************************************
ok: [default]
```

```
NOTIFIED: [restart apache2] ************************************************
changed: [default]


NOTIFIED: [restart nagios3] ************************************************
changed: [default]


PLAY RECAP *******************************************************************
default                    : ok=25   changed=21   unreachable=0    failed=0
```

6. Attached files:

6.1. Vagrantfile

```ruby
# Vagrantfile API/syntax version. Don't touch unless you know what you're doing!
VAGRANTFILE_API_VERSION = "2"
Vagrant.configure(VAGRANTFILE_API_VERSION) do |config|
    config.vm.box = "precise32"
    config.vm.box_url = "http://files.vagrantup.com/precise32.box"
    config.vm.network :public_network
    config.vm.network "forwarded_port", guest: 80, host: 8080
    config.vm.network "forwarded_port", guest: 443, host: 8443
    config.vm.network "forwarded_port", guest: 8080, host: 8888
    config.vm.provision "ansible" do |ansible|
        ansible.playbook = "playbook.yml"
    end
end
```

6.2. Ansible playbook.yml

```yaml
---

- hosts: all

  remote_user: vagrant

  sudo: yes

  tasks:

    - name: set timezone

      copy: src=/usr/share/zoneinfo/Europe/Warsaw dest=/etc/localtime owner=root group=root
mode=0644

    - name: install apache

      apt: pkg=apache2 state=installed update_cache=true

      notify:

        - start apache2

    - name: install tomcat

      apt: pkg=tomcat7 state=installed update_cache=true

      notify:

        - start tomcat7

    - name: install tomcat-admin

      apt: pkg=tomcat7-admin state=installed update_cache=true

    - name: copy tomcat users file

      copy: src=tomcat-users.xml dest=/etc/tomcat7/tomcat-users.xml owner=root group=root
mode=0644

    - name: add tomcat to rc.d

      shell: update-rc.d tomcat7 defaults

      register: updaterc_result

      changed_when: "'already exist' not in updaterc_result.stdout"

    - name: odata.war deploy

      copy: src=odata.war dest=/var/lib/tomcat7/webapps/odata.war owner:tomcat group:tomcat
mode=0644

    - name: install php

      apt: pkg=php5 state=installed update_cache=true

    - name: install nagios

      apt: pkg=nagios3 state=installed update_cache=true

    - name: copy nagios configuration 1

      copy: src=check_tomcatSessions dest=/usr/lib/nagios/plugins/check_tomcatSessions
owner=root group=root mode=0755

      notify:
```

```yaml
      - restart nagios3

  - name: copy nagios configuration 2

    copy: src=services_nagios2.cfg dest=/etc/nagios3/conf.d/services_nagios2.cfg owner=root
group=root mode=0644

    notify:

      - restart nagios3

  - name: copy nagios configuration 3

    copy: src=hostgroups_nagios2.cfg dest=/etc/nagios3/conf.d/hostgroups_nagios2.cfg
owner=root group=root mode=0644

    notify:

      - restart nagios3

  - name: copy nagios configuration 4

    copy: src=tomcat.cfg dest=/etc/nagios-plugins/config/tomcat.cfg owner=root group=root
mode=0644

    notify:

      - restart nagios3

  - name: copy nagios configuration 5

    copy: src=htpasswd.users dest=/etc/nagios3/htpasswd.users owner=root group=root
mode=0644

    notify:

      - restart nagios3

  - name: copy proxypass config for apache

    copy: src=tomcat-proxypass dest=/etc/apache2/sites-available/tomcat-proxypass owner=root
group=root mode=0644

  - name: copy index page

    copy: src=index.php dest=/var/www/index.php owner=root group=root mode=0644

  - name: enable ssl for apache

    shell: a2enmod ssl

    register: a2enmod_result

    changed_when: "'already enabled' not in a2enmod_result.stdout"

    notify:

      - restart apache2

  - name: enable proxy_http for apache

    shell: a2enmod proxy_http

    register: a2enmod_result

    changed_when: "'already enabled' not in a2enmod_result.stdout"

    notify:

      - restart apache2

  - name: enable ssl vhost
```

```yaml
    shell: a2ensite default-ssl

    register: a2ensite_result

    changed_when: "'already enabled' not in a2ensite_result.stdout"

    notify:

      - restart apache2

  - name: enable tomcat-proxypass

    shell: a2ensite tomcat-proxypass

    register: a2ensite_result

    changed_when: "'already enabled' not in a2ensite_result.stdout"

    notify:

      - restart apache2

handlers:

  - name: start apache2

    service: name=apache2 state=started

  - name: start tomcat7

    service: name=tomcat7 state=started

  - name: restart apache2

    service: name=apache2 state=restarted

  - name: restart tomcat7

    service: name=tomcat7 state=restarted

  - name: restart nagios3

    service: name=nagios3 state=restarted
```

7. Changes to the default Nagios configuration:

7.1. hostgroups_nagios2.cfg:

```
define hostgroup {
        hostgroup_name  tomcat-servers
                alias           Tomcat servers
                members         localhost
```

}

7.2. services_nagios2.cfg

```
# check tomcat sessions
define service {
        hostgroup_name                  tomcat-servers
        service_description             TOMCAT_SESSIONS
        check_command                   check_tomcatSessions
        use                             generic-service
        notification_interval           0 ; set > 0 if you want to be renotified
}
```

7.3. tomcat.cfg (new file)

```
# check_tomcatSessions command definition
define command{
        command_name    check_tomcatSessions
        command_line    /usr/lib/nagios/plugins/check_tomcatSessions
        }
```

7.4. check_tomcatSessions (new file)

```
#!/bin/sh

# Set some defaults
export THE_VERSION="1.1"
export THE_USERNAME=tomcat
export THE_PASSWORD=admin
export THE_HOSTNAME=localhost
export THE_PORT=8080
export SESSION_NAME=""
export WARNING_LEVEL=100
export CRITICAL_LEVEL=400
export NUMSESS=""
export TOMCAT_VERSION="7"

export OK_STATUSLEVEL=0
export OK_STATUSSTRING="OK"
export WARNING_STATUSLEVEL=1
export WARNING_STATUSSTRING="WARNING"
export CRITICAL_STATUSLEVEL=2
export CRITICAL_STATUSSTRING="CRITICAL"
export UNKNOWN_STATUSLEVEL=3
export UNKNOWN_STATUSSTRING="UNKNOWN"

export STATUSLEVEL=$OK_STATUSLEVEL
export STATUSSTRING="$OK_STATUSSTRING"

export WGET=`which wget`
if [ -z "$WGET" ]
then
        wget command not found. This plugin depends on it. Please install it and put
it in path.
        exit 1
fi

export AWK=`which awk`
if [ -z "$AWK" ]
then
```

```
        awk command not found. This plugin depends on it. Please install it and put it
in path.
        exit 1
fi

usage ()
{
        echo "Usage: `basename $0` [ -H hostname or IP address ] [ -P port ] [ -u
username ] [ -p password ] [ -s session_name ] [ -w warning ] [ -c critical ] [ -V
tomcat_version (6 for tomcat pre-7 or 7) ]" >&2
        echo ""
        echo "If session_name is omitted (default) then the total number of sessions
is calculated" >&2
        echo ""
        echo "DEFAULTS" >&2
        echo "hostname=localhost" >&2
        echo "port=8080" >&2
        echo "username=Administrator" >&2
        echo "password=password" >&2
        echo "session_name=""" >&2
        echo "warning=100" >&2
        echo "critical=400" >&2
        echo "tomcat_version=6" >&2

        exit 1
}

version ()
{
        echo "`basename $0` $THE_VERSION"
}

# MAIN

while getopts ":u:p:H:P:s:w:c:V:hv" opt
do
        case "$opt" in
                u)
                        THE_USERNAME="$OPTARG"
                ;;
                p)
                        THE_PASSWORD="$OPTARG"
                ;;
                H)
                        THE_HOSTNAME="$OPTARG"
                ;;
                P)
                        THE_PORT="$OPTARG"
                ;;
                s)
                        SESSION_NAME="$OPTARG"
                ;;
                w)
                        WARNING_LEVEL="$OPTARG"
                ;;
                c)
                        CRITICAL_LEVEL="$OPTARG"
                ;;
                h)
                        usage
                        exit 1
                ;;
                V)
                        TOMCAT_VERSION="$OPTARG"
                ;;
                v)
                        version
                        exit 1
                ;;
        esac
done


#NUMSESS=`$WGET -o /dev/null -O -
"http://$THE_USERNAME:$THE_PASSWORD@$THE_HOSTNAME:$THE_PORT/manager/html" | $AWK -F
">|<" ' /row-center.*path.*'$SESSION_NAME'/ { SUM+=$7 } END { print SUM }'`
case $TOMCAT_VERSION in
```

```
        6):
                NUMSESS_PATH="manager/list"
                ;;
        7)
                NUMSESS_PATH="manager/text/list"
                ;;
        *)
                echo "Available versions are: "
                echo "  6 (default: all tomcat pre-7)"
                echo "  7 tomcat 7"
                exit 1
                ;;
esac
NUMSESS=`$WGET -o /dev/null -O -
"http://$THE_USERNAME:$THE_PASSWORD@$THE_HOSTNAME:$THE_PORT/$NUMSESS_PATH" | $AWK -F
":" ' /'$SESSION_NAME':/ { SUM+=$3 } END { print SUM }'`

if [ -z "$NUMSESS" -o "$?" -gt 0 ]
then
        STATUSLEVEL=$UNKNOWN_STATUSLEVEL
        STATUSSTRING="$UNKNOWN_STATUSSTRING"
fi
if [ $(( NUMSESS - WARNING_LEVEL )) -ge 0 ]
then
        STATUSLEVEL=$WARNING_STATUSLEVEL
        STATUSSTRING="$WARNING_STATUSSTRING"
        if [ $(( NUMSESS - CRITICAL_LEVEL )) -ge 0 ]
        then
                STATUSLEVEL=$CRITICAL_STATUSLEVEL
                STATUSSTRING="$CRITICAL_STATUSSTRING"
        fi
fi

echo "Tomcat sessions $SESSION_NAME $STATUSSTRING: $NUMSESS | sessions=$NUMSESS"

exit $STATUSLEVEL
```