Tcl and Cloud Computing Automation

Tclcloud, Tclwinrm & Cato

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- TclCloud - Tcl api for AWS public cloud / Ecualyptus private cloud
- Tclwinrm - Tcl api for the Windows remote management protocol
- Cloud Sidekick Cato - open source framework for cloud and enterprise IT automation

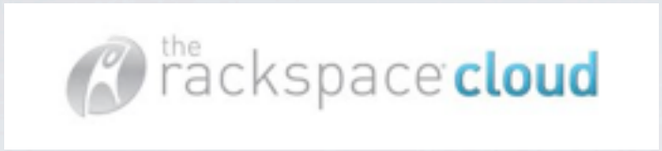
agenda

show of hands

- shared computing resources, no capital expense (public)
- on demand, pay only for what you use
- scales massively
- elastic, grows and shrinks
- api / web service driven

cloud principles

public cloud



hybrid

private cloud

iaas - infrastructure as a service

- Tclcloud - web service cloud api for managing and automating cloud environments

- not abstracted: direct correlation to cloud vendor api actions; a wrapper around the web service client

- currently supports Amazon AWS, Eucalyptus

- near future releases: VMWare vCloud, Cloud.com, Opsource, etc.

- home: https://github.com/cloudsidekick/tclcloud

Tclcloud

- bootstrap: run virtual servers (EC2 instances), terminate instances
- network: (EC2 security groups, VPC - virtual private cloud, elastic ip), define ELBs (Elastic Load Balancers)
- monitor: EC2 instances, failover database master to slave, applications
- administer: add, remove, snapshot EBS volumes and devices, create AMI images
- high performance computing: run Elastic Map Reduce (Hadoop) jobs

Tclcloud uses

```
package require tclcloud
set access_key DKE65EEFEETGHJJS7E782D
set secret_key f6gbUsddYr62MFJRi93wWHd8el3drcjE5BnTZf

set ::tclcloud::debug 1
set conn [::tclcloud::connection new $access_key $secret_key]

lappend args Filter.1.Name architecture Filter.1.Value.1 x86_64 Filter.2.Name root-device-type Filter.2.Value.1 ebs \
       Filter.3.Name name Filter.3.Value.1 {bitnami-wordpress-3.2.1-1-linux-x64-ubuntu-10.04-ebs}

set result [$conn call_aws ec2 {} DescribeImages $args]

puts $result
$conn destroy
```

- aws api access key
- aws secret key

- set debug for verbose
- define connection object

- tcl list of arguments passed to aws

- DescribeImages api call

- print xml results
- destroy connection object

```
<?xml version="1.0" encoding="UTF-8"?>
<DescribeImagesResponse xmlns="http://ec2.amazonaws.com/doc/2011-07-15/">
   <requestId>e57a67e7-4ae7-453d-907d-c4ab6b33c38f</requestId>
   <imagesSet>
      <item>
         <imageId>ami-3f7dbd56</imageId>
         <imageLocation>979382823631/bitnami-wordpress-3.2.1-1-linux-x64-ubuntu-10.04-ebs</imageLocation>
         <imageState>available</imageState>
         <imageOwnerId>979382823631</imageOwnerId>
         <isPublic>true</isPublic>
         <architecture>x86_64</architecture>
         <imageType>machine</imageType>
         <kernelId>aki-427d952b</kernelId>
         <name>bitnami-wordpress-3.2.1-1-linux-x64-ubuntu-10.04-ebs</name>
         <description>BitNami Wordpress 3.2.1-1  EBS AMI</description>
         <rootDeviceType>ebs</rootDeviceType>
         <rootDeviceName>/dev/sda1</rootDeviceName>
         <blockDeviceMapping>
            <item>
               <deviceName>/dev/sda1</deviceName>
               <ebs>
                  <snapshotId>snap-1c85127c</snapshotId>
                  <volumeSize>10</volumeSize>
                  <deleteOnTermination>true</deleteOnTermination>
               </ebs>
            </item>
         </blockDeviceMapping>
         <virtualizationType>paravirtual</virtualizationType>
         <hypervisor>xen</hypervisor>
      </item>
   </imagesSet>
</DescribeImagesResponse>
```

- image identifier

- 64 bit

- wordpress image
- elastic block store

- 10 gig image

... continued ...

```
package require tdom

proc strip_namespaces {xml} {
        set xmldoc [dom parse -simple $xml]
        set root [$xmldoc documentElement]
        set xml_no_ns [[$root removeAttribute xmlns] asXML]
        $root delete
        $xmldoc delete
        return $xml_no_ns
}

proc get_xpath_value {xml path} {
        set xmldoc [dom parse -simple $xml]
        set root [$xmldoc documentElement]
        set value [$root selectNodes string($path)]
        $root delete
        $xmldoc delete
        return $value
}

set result [strip_namespaces $result]
set imageId [get_xpath_value $result //imageId]

puts "The image is $imageId"
```

- tdom to parse xml

- a helper procedure using tdom to remove the namespace from xml (make it easier)

- a helper procedure using tdom to get data out of xml (simple example, could be more efficient)

- call the strip namespaces
- get the image id using xpath

- print image id

- use xpath query to extract results from returned data
- tdom works well for this
- xpath tutorial: http://www.w3schools.com/xpath/

samples/sample_tclwinrm.tcl

DescribeImages

get imageId

RunInstances

get instanceId

check status in loop

DescribeInstances

is running?

get external address

wait for boot to finish

http://external.address

end

demo example

- Microsoft WinRM - Windows Remote Management
- SOAP based web service
- administration and automation capabilities without RPC / DCOM
- Server 2008+

- winRS - Windows Remote Shell
- win command line tools standard
- still, linux clients limited

winrm

- Tclwinrm - client-side Tcl extension for interaction with the WinRM service
- remotely manage Windows servers from linux (yay!)
- Windows command line commands, PowerScript
- Microsoft Server Core 2008 R2
- future releases: ssl, digest / kerberos auth
- enables automation in cloud & data center
- https://github.com/cloudsidekick/tclwinrm

Tclwinrm

- install and configure software
- remote administration
- monitoring: server and application
- run central PowerScript library
- did I mention manage Windows from linux?

Tclwinrm uses

```
package require tclwinrm
package require base64

puts "local machine is $::tcl_platform(os)"

set address ec2-107-20-119-132.compute-1.amazonaws.com
set port 5985
set user administrator
set pass p@ssw0rd

set conn [tclwinrm::connection new http $address $port $user $pass]

set script {$strComputer = $Host
        $RAM = WmiObject Win32_ComputerSystem
        $MB = 1048576
        "Win host Installed Memory: " + [int]($RAM.TotalPhysicalMemory /$MB) + " MB"
}
set command "powershell -encodedcommand [::base64::encode -wrapchar "" [encoding convertto unicode $script]]"
set result [$conn rshell $command 120 0]
puts \n$result

set command {dir c:\ }
set result [$conn rshell $command 120 0]
puts $result
exit
```

- base64 required for powershell scripts

- print local os

- port 5985 standard on 2008 R2
- user with winrm connect rights

- define connection object

- a simple powershell script

- base64 encode script
- call remote shell on win server
- print result

- a simple dos command, no encoding
- call remote shell
- print result

```
local machine is Linux

Win host Installed Memory: 615 MB

 Volume in drive C has no label.
 Volume Serial Number is 8E0B-09AF

 Directory of c:\

07/14/2009  03:34 AM    <DIR>          PerfLogs
11/13/2010  12:13 PM    <DIR>          Program Files
11/13/2010  11:49 AM    <DIR>          Program Files (x86)
11/13/2010  04:16 AM                 9 query
06/27/2011  03:35 PM    <DIR>          Users
06/27/2011  03:04 PM    <DIR>          Windows
               1 File(s)              9 bytes
               5 Dir(s)  11,147,808,768 bytes free
```

- local os

- result from powershell script

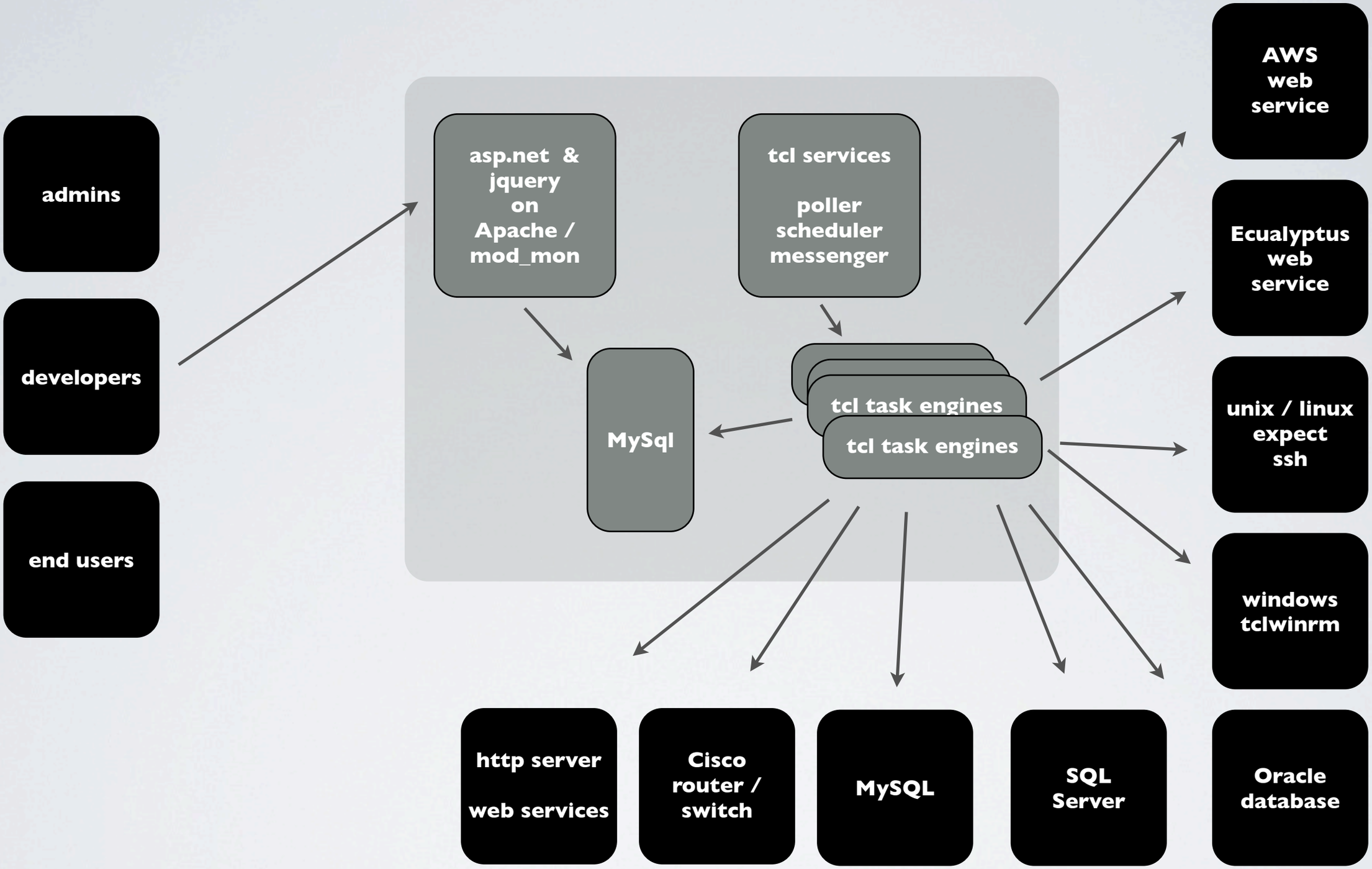
- result from dos command

- open source (Apache 2)
- architecture
  - browser based UI (.net on linux / mono)
  - database (MySql)
  - automation engine (Tcl)
- automation toolkit
- central script repository (Tasks)
- build Tasks drag and drop
- run now or scheduled
- supports cloud apis (Tclcloud), ssh (Expect), databases (OraTcl, mysqltcl, tcltds), windows (Tclwinrm)

Cloud Sidekick - Cato

- starting / stopping virtual servers, bootstrapping
- deploying / upgrading application software
- moving data on databases / filesystems
- monitoring application performance
- release builds / testing
- refreshing data
- configuring networking, "virtual private clouds"
- enabling hybrid clouds (public to private / data center)
- database administration
- scaling applications
- backup filesystems / databases
- enable user self service

Cato uses

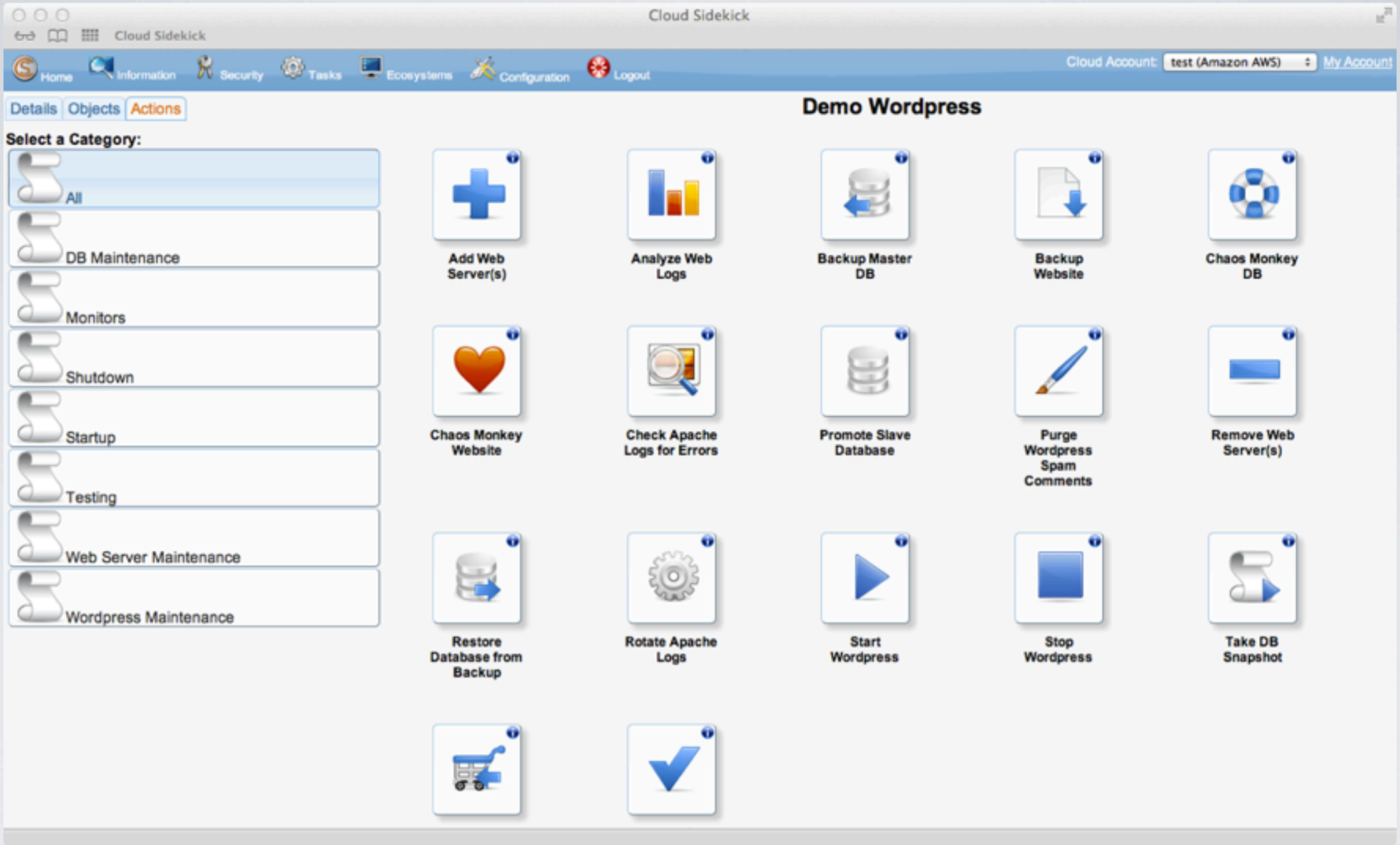


Cato architecture

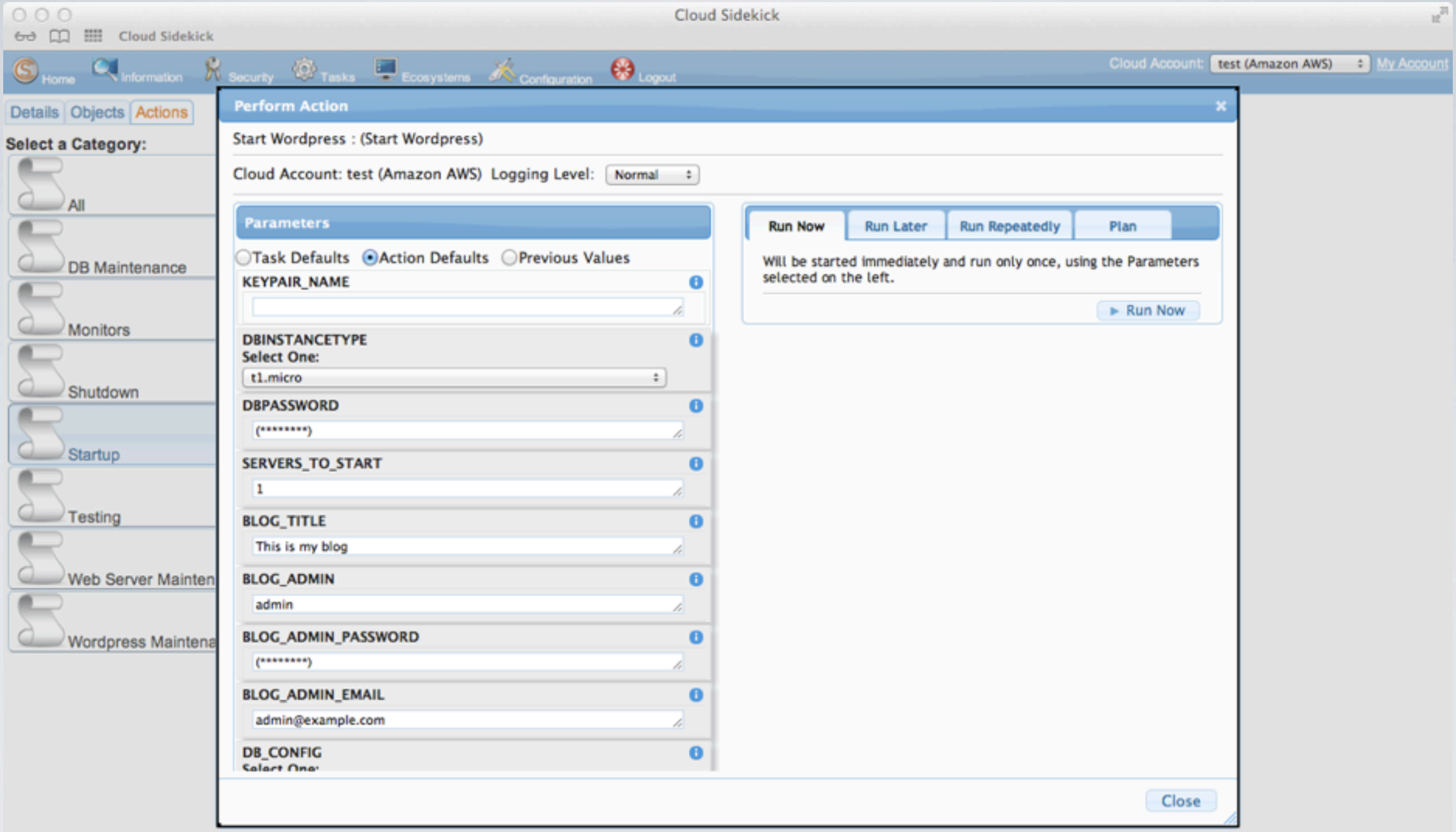
- more clouds apis: Cloud.com CloudStack, VmWare vSphere, Rackspace, Opsource, OpenStack, etc.
- interfaces: rabbitMQ messaging bus, Puppet / Chef integration, RightScale
- packaging apt-get Ubuntu / Debian, rpm Redhat, etc.
- action / task template library, community based

Cato future

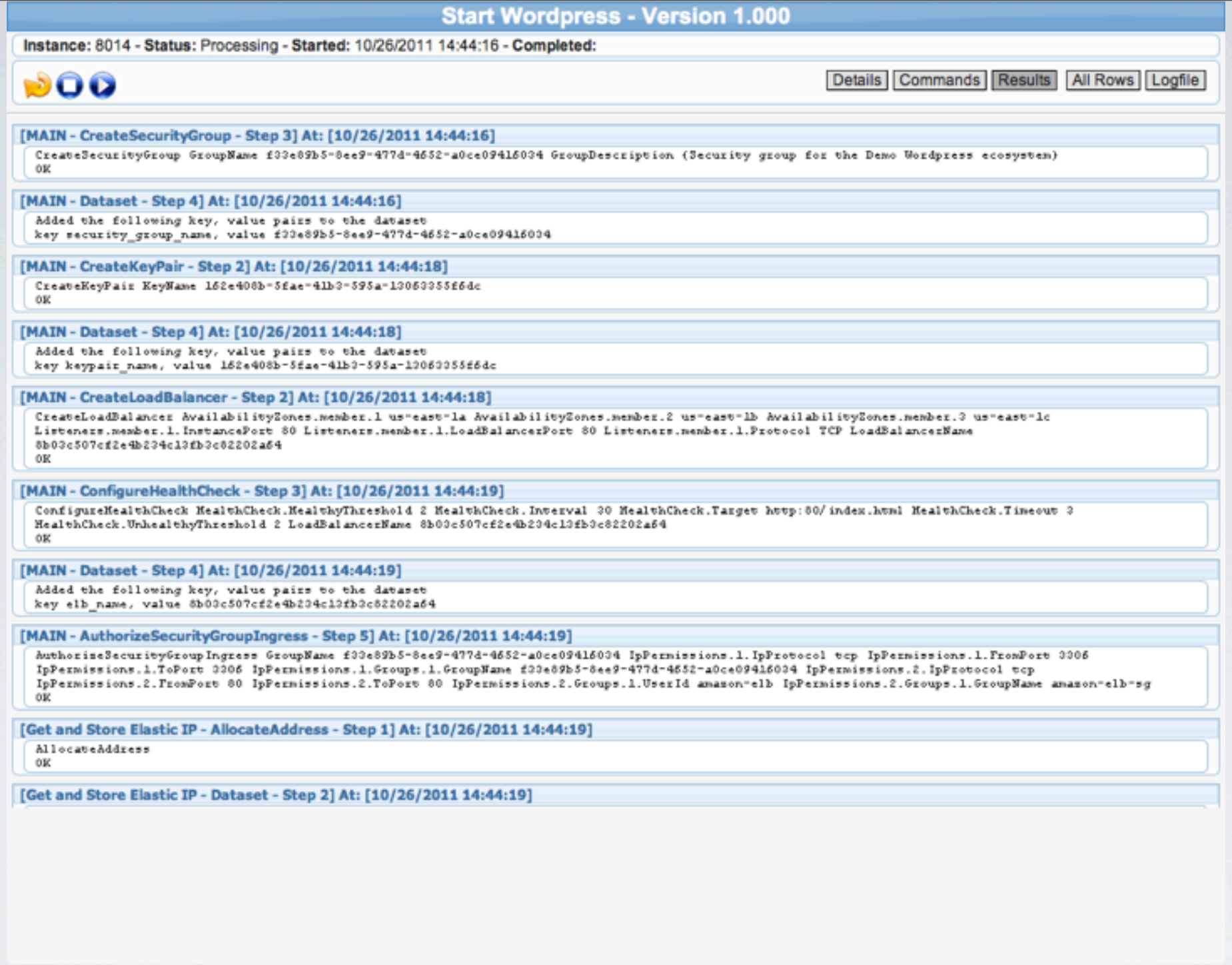
Cato demo



create actions to enable user self service



a user launches an action



action launched, view log in browser...

Cloud Sidekick

Start Wordpress - Version 1.000

Instance: 8014 - **Status:** Processing - **Started:** 10/26/2011 14:44:16 - **Completed:**

Details | Commands | Results | All Rows | Logfile

[MAIN - New Connection - Step 2] At: [10/26/2011 14:44:51] On Connection: [i-6bfb0508]

```
Connecting to (ubuntu@i-6bfb0508)...
ssh connection to host=10.206.98.59, user=ubuntu established.
New connection named CONN1 to asset ubuntu@i-6bfb0508 created with a connection type ssh - ec2
```

[MAIN - Sleep - Step 3] At: [10/26/2011 14:45:33]

```
Sleeping (60) seconds...
```

[MAIN - Command Line - Step 4] At: [10/26/2011 14:46:33] On Connection: [CONN1]

```
sudo mysql -u root -p[redacted]
Welcome to the MySQL monitor.  Commands end with ; or g.
Your MySQL connection id is 34
Server version: 5.1.54-1ubuntu4 (Ubuntu)

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Type 'help;' or 'h' for help. Type 'c' to clear the current input statement.

mysql>
```

[MAIN - Command Line - Step 5] At: [10/26/2011 14:46:33] On Connection: [CONN1]

```
create database wordpress;
Query OK, 1 row affected (0.00 sec)

mysql>
```

[MAIN - Command Line - Step 6] At: [10/26/2011 14:46:33] On Connection: [CONN1]

```
grant all privileges on wordpress.* to "wordpress"@"%" identified by "wordpress";
Query OK, 0 rows affected (0.00 sec)

mysql>
```

[MAIN - Command Line - Step 7] At: [10/26/2011 14:46:33] On Connection: [CONN1]

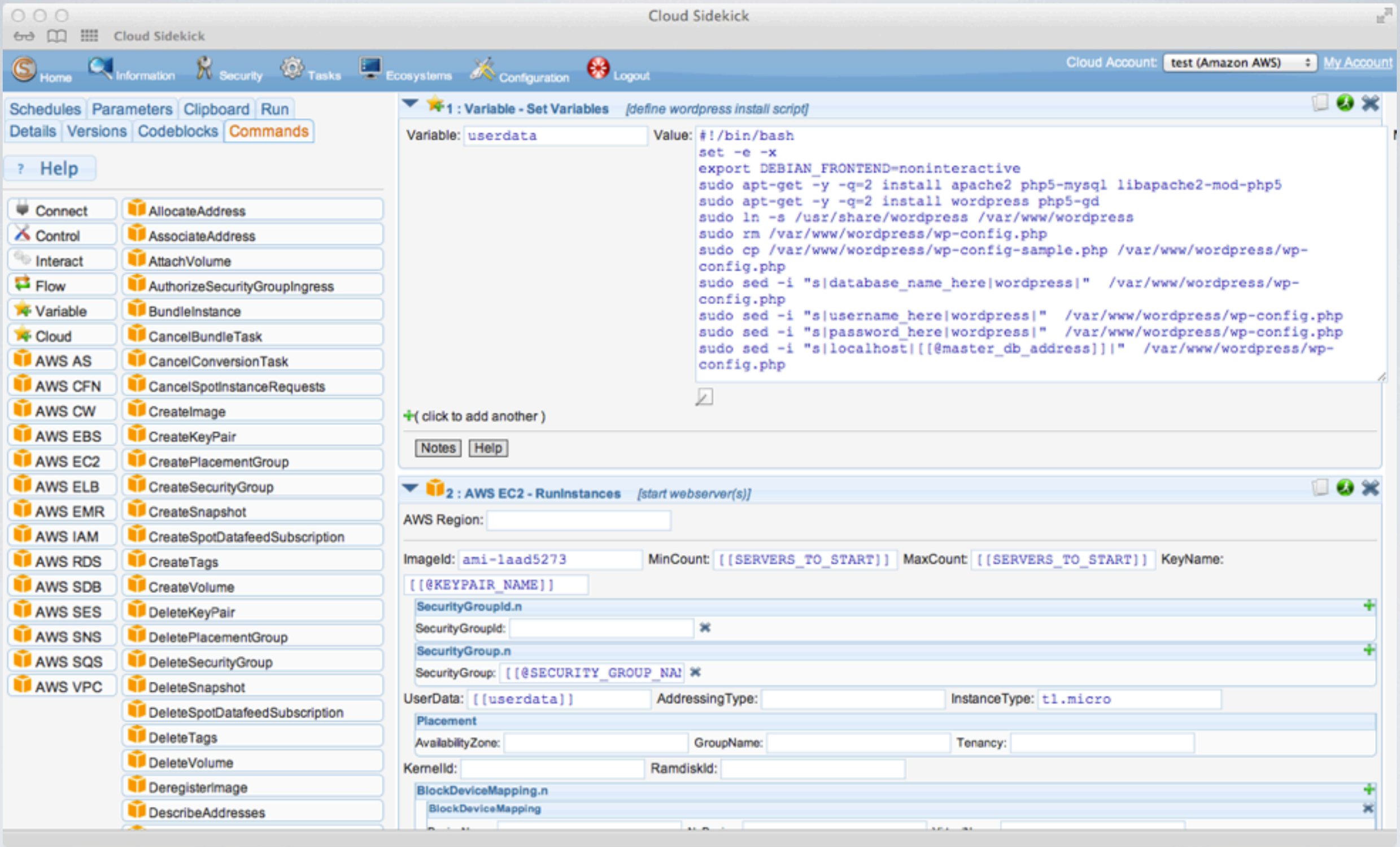
```
flush privileges;
Query OK, 0 rows affected (0.00 sec)

mysql>
```

[MAIN - Command Line - Step 8] At: [10/26/2011 14:46:33] On Connection: [CONN1]

```
exit;
```

... log continued, linux server started and ssh'ing in



action = task, task edit interface
drag and drop

company site:

http://www.cloudsidekick.com

community site:

http://community.cloudsidekick.com

github:

https://github.com/cloudsidekick/cato

wiki, forum, bugs

http://projects.cloudsidekick.com/projects/cato

check it out, get involved

thanks

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