ukcloud

Manipulating Power States with PowerCLI

UKC-GEN-339

OVERVIEW

PowerCLI is a command line interface tool developed by VMware and built upon Microsoft PowerShell. The tool is designed to allow manipulation, automation, management and control over vSphere and vCloud Director Assets.

PowerCLI can help you realise some of the fundamental benefits of cloud computing, such as on-demand self-service. Controlling virtual machine power states programmatically, to turn off compute elements when they are no longer required, can help you save up to 70% on your compute costs by taking advantage of hourly billing. For example, you could power off an internal room-booking system when staff are at home during evenings and weekends.

This blueprint describes the basics of how to use PowerCLI to power VMs and vApps on and off via a script, and then automate the script so that it can run unattended.

Tools for the job

PowerCLI is a Microsoft Windows tool and therefore needs to be installed on a Windows-based environment. The latest version of PowerCLI is available from the VMware website with all required subcomponents needed for the install https://www.vmware.com/support/developer/PowerCLI/.

If you are not running Windows in your environment, contact UKCloud support or a UKCloud Cloud Architect for specific advice on open source alternatives that are available.

UKCloud recommends installing PowerCLI onto a reference management machine, separate from the controlled environment. This management machine should not be powered off, and could be a standalone virtual server within UKCloud, or any other Windows machine with HTTP access to the UKCloud API URL.

You may also find a good script editor useful. There are several available for free, such as MS PowerShell IDE, Notepad++ and NetBeans.

Metadata tags

The scripts used to control power states of VMs and vApps in this blueprint rely heavily on metadata tags within vCloud Director. Metadata tags enable you to assign bespoke data keys and values to certain vCloud Director objects; whether aimed at a VM level, vApp level or at other objects such as networks and users. In this blueprint, we use metadata tags to create custom attributes the script will use to identify the vApps or VMs that need to be powered on or off, and at what time the action should occur.

Key	Value	Usage examples
AutoOnOff	Yes or No	Setting to No disables start/stop
StartTime	24 hour clock hour value	07 for 0700 19 for 1900 12 for midday
StopTime	24 hour clock hour value	07 for 0700 19 for 1900 12 for midday
Days	Day of the week as three letters, or Every	MonTueFri SatSun Every

To assign metadata to an object:

1) Login to the UKCloud Portal using org admin credentials, then log into vCloud Director.
2) From the **vApps** tab, under **My Cloud,** right click the vApp to which you want to assign tag data and select **Properties.**
3) In the new window, select the **Metadata** tab and enter the required tag data as described in the table above.

The image below shows that the vApp will be powered on **every day** at **0700** and off again at **1700**.

When targeting a vApp container that comprises multiple VMs, you can define the order in which those VMs are powered on and off. This ordering can assist with bringing a solution within the vApp up and down gracefully. Navigate to the **Starting and Stopping VMs** tab and fill out your desired order. It is worth noting that that the stop-delay is not very effective as vCloud Director waits for a power-off operation to complete before moving to the next VM in the vApp.

This control ensures that reliant services from different servers are established before powering on and off (for example, ensuring a database is up and running before web clients attempt to connect to it). As your cloud environment increases in complexity, UKCloud provides additional scripts, located in the GitHub repository (https://github.com/ukcloud-cloud-

services/AutoStartStop), that you can use to run reports against any assigned metadata:

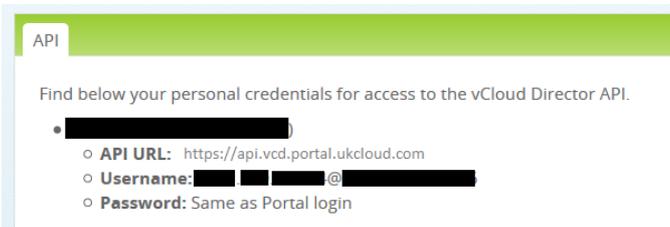- `CheckVMMetadata`
- `CheckVAPPMetadata`

Connecting to the UKCloud Cloud Platform

The PowerCLI script connects to vCloud Director using a privileged account so it is advisable to create a user in the UKCloud Portal with only **API Only** access. This ensures that the account cannot be used to access the GUI, limiting the risk associated with an administrative account. Also, as an API Only account cannot utilise additional security features, such as Google 2-Step Verification, it is advisable to restrict the account so that it can log in only from specific IP addresses. You can configure these permissions under the **Contacts** section of the UKCloud Portal.

You usually log in to the portal using an email address and password. For API Only access a unique user ID is generated for each UKCloud account you wish to log into. You need to specify these unique identifiers when running the scripts to connect to the UKCloud environment.

You can find API credentials and URL details on the UKCloud Portal when you have logged in:

1) In the top right hand corner, click the drop down under the logged in user name.
2) Select **API.**
3) In the new window, your API details are listed.

API

Find below your personal credentials for access to the vCloud Director API.

- ○ API URL: https://api.vcd.portal.ukcloud.com
- ○ Username: ████ ██ ██████@█████████
- ○ Password: Same as Portal login

This blueprint uses the ASSURED internet connected platform. Host names and details are unique to each platform and you should check via the portal before connecting.

On the reference server with PowerCLI installed, open the console.

To connect to the UKCloud platform, enter the following command:

```
Connect-CIServer -server
api.vcd.portal.ukcloudcloud.com -Org
"ORGNAME" -Username "USERNAME"
-Password "PASSWORD"
```

Ensure that you change the inputs (in italics) to your unique account details. When you have successfully connected, you can use PowerCLI commands to manipulate objects within your connected vDC organisation.

For more information on PowerCLI, there is a wide range of documentation from VMware, or generally available from a standard web search. We recommend that you start with the VMware blog pages: https://blogs.vmware.com/PowerCLI

Using PowerCLI and metadata to control object power states

Now you understand PowerCLI and metadata tags, you can use them together to create an automated script to manipulate objects within your organisation. As stated earlier, this blueprint only goes as far as turning vApps or VMs on or off based on time and day. There is a lot more you can explore, such as load balancing, provisioning and resource on-demand powering. Feel free to take any scripts from the UKCloud GitHub repository (https://github.com/ukcloud-cloud-services/AutoStartStop) and edit them to meet your own specific requirements.

The `AutoPowerVAPP` script powers a vApp on or off depending on the metadata of the object being referenced. If the metadata rules are breached then PowerCLI remediates them and powers a vApp on or off accordingly.

1) Create a test vApp and assign metadata to it as outlined above to ensure the vApp turns on when the script is executed.

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2) From the command machine, run PowerCLI and run the `AutoPowerVAPP` script.
3) Check the vDC GUI to confirm if the vApp power state has changed.
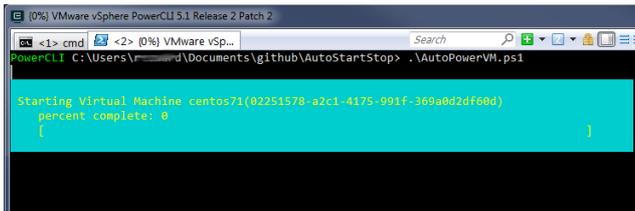
The `AutoPowerVM` script changes the power state of any VM with associated metadata tag rules.

Create VMs inside the test vApp and test out the script with a few different options.
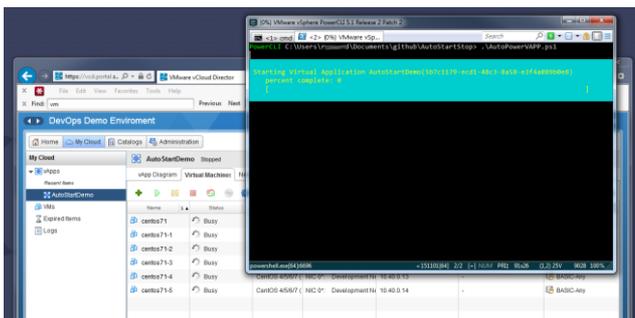

Automating the scripts

So, now you can control VMs and vApps from a script based on metadata you assign to a vDC object. Finally, you need to automate this so that you do not need to manually run this at 0700 and 1900 every weekday.

Although there are a few options on how automate the scripts, the one selected for this blueprint provides you with administrator control and visibility of what is going on with your cloud environment.

The Knowledge Centre and GitHub repository include two scripts (`Every5Mins` and `AutoPowerVM`). These scripts work together with `Every5mins` calling the `AutoPowerVM` script every five minutes. You can change this interval by editing the millisecond timer to meet your requirements.

The file paths are set to `c:\temp` but you can also change this by editing the script. The `AutoPowerVM` script executes every five minutes against the required target (VM or vApp), to remediate against the metadata rule sets you assigned.
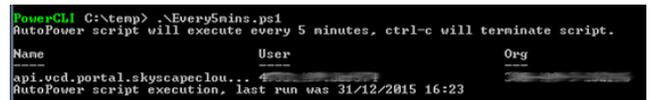
Run the script from a PowerCLI console. It will be executed every five minutes and will display on the console when it last ran and if there were any changes to the power state of the object. The task will run until you stop it by either closing the window or ending it with Ctrl-c.

This automation enables you to power VMs and vApps on and off on a timed schedule, while retaining control of what is happening when and where.

Further functionality

As previously mentioned, this blueprint helps you learn how to start to manipulate power states within your cloud environment. You should use this as the first building block to get your solution realising the benefits of elastic on-demand compute with hourly billing. Why pay for a service you are only using for 60% of the time when you can achieve dramatic cost savings with a simple script?

Not all VMs and vApps are candidates for being powered down. For example, the work involved in getting a large database consistent and up and running may outweigh the cost benefits of automating the power state.

Feel free to modify the script. There are lots of ways you could enhance it, such as writing out to a log file to provide a more auditable trace for management, adding email alerting or tie-ins with other third party services (such as Nagios, SCCM, and so on).

If you have created something that you think others in the UKCloud community could also benefit from, then let us know so we can share it via our Knowledge Centre or GitHub repository.

We also provide customer webinars demonstrating these scripts. If you want to view a previous webinar or sign up to watch a future one live, then speak to your account manager or contact our support teams to arrange it.

ABOUT UKCLOUD

UKCloud has developed a range of cloud services designed specifically for the UK public sector, to help increase efficiencies, reduce costs, significantly improve procurement times and increase transparency. Our services are *easy to adopt, easy to use and easy to leave* to ensure that our customers remain in complete control with minimum risk. We were one of the first G-Cloud providers to achieve Pan Government Accreditation (PGA) up to Elevated OFFICIAL, and our services continue to achieve formal UK Government accreditations which make them suitable for all data at OFFICIAL (including OFFICIAL-SENSITIVE).

UKCloud's full offering consists of:

1. Infrastructure as a Service (IaaS) – seven offerings around Compute and Storage on demand

2. Software as a Service (SaaS) – offerings for email and collaboration as well as secure sync-and-share of files to help teams work effectively in groups, using a variety of devices

3. Platform as a Service (PaaS) – based upon Open Source Digital Application Platform and Hadoop which provides organisations the benefits of using a commodity cloud platform without the added management overheads

All of UKCloud's UK sovereign cloud computing services are hosted in one (or both) of our highly resilient Tier 3 UK data centres in Farnborough and Corsham. UKCloud services are delivered with leading technologies from UKCloud Alliance Partners: QinetiQ, VMware, Cisco, EMC and Ark Data Centres. The Cloud Alliance also provides a collaborative resource which drives innovation and technical product development, helping to continually improve UKCloud's offering to meet the needs of the UK public sector.

UKCloud is focused on providing cloud services in a more agile, secure and cost effective manner. We strive to deliver solutions that harness technology as a way to facilitate the changes that are needed to streamline processes and reduce costs to support the UK public sector and, ultimately, UK citizens and taxpayers.

MORE INFORMATION ▶

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