

Azure Cost Focus Review

Last updated by | Paul Kelleher | 17 Jun 2020 at 07:44 GMT

Person A Ask 

Person B Ask 

Overview

The business has started the cloud first journey while ensuring that the up-skill of staff has not hindered project delivery. The learning curve and journey this far has led to the effective technical implementation that has lacked business accountability and focus on "right-size" implementation.

Recommendations and Guidance will be delivered and can be quickly focused on by using the following convention

Tag	Expansion	Detail
BPx	Business Process	Overall changes to how we manage the delivery into Azure and ongoing cost management that would increase accountability and allow smaller scale ownership and focus
INx	Investigative Process	Technical or Business Use investigation by the defined product , project or resource owners that would combine business use and requirements with technical solutions to right-size effectively without increasing business risk
RPx	Reporting Guidance	Tools, Products or Processes to effectively monitor and analyze the resulting data to help the business approve technical actions
TAx	Technical Actions	Options and Recommendations for engineers to use to make recommendations to get the right balance between business use, availability and actions requiring maintenance or downtime (such as instance resizing, powerdowns etc)

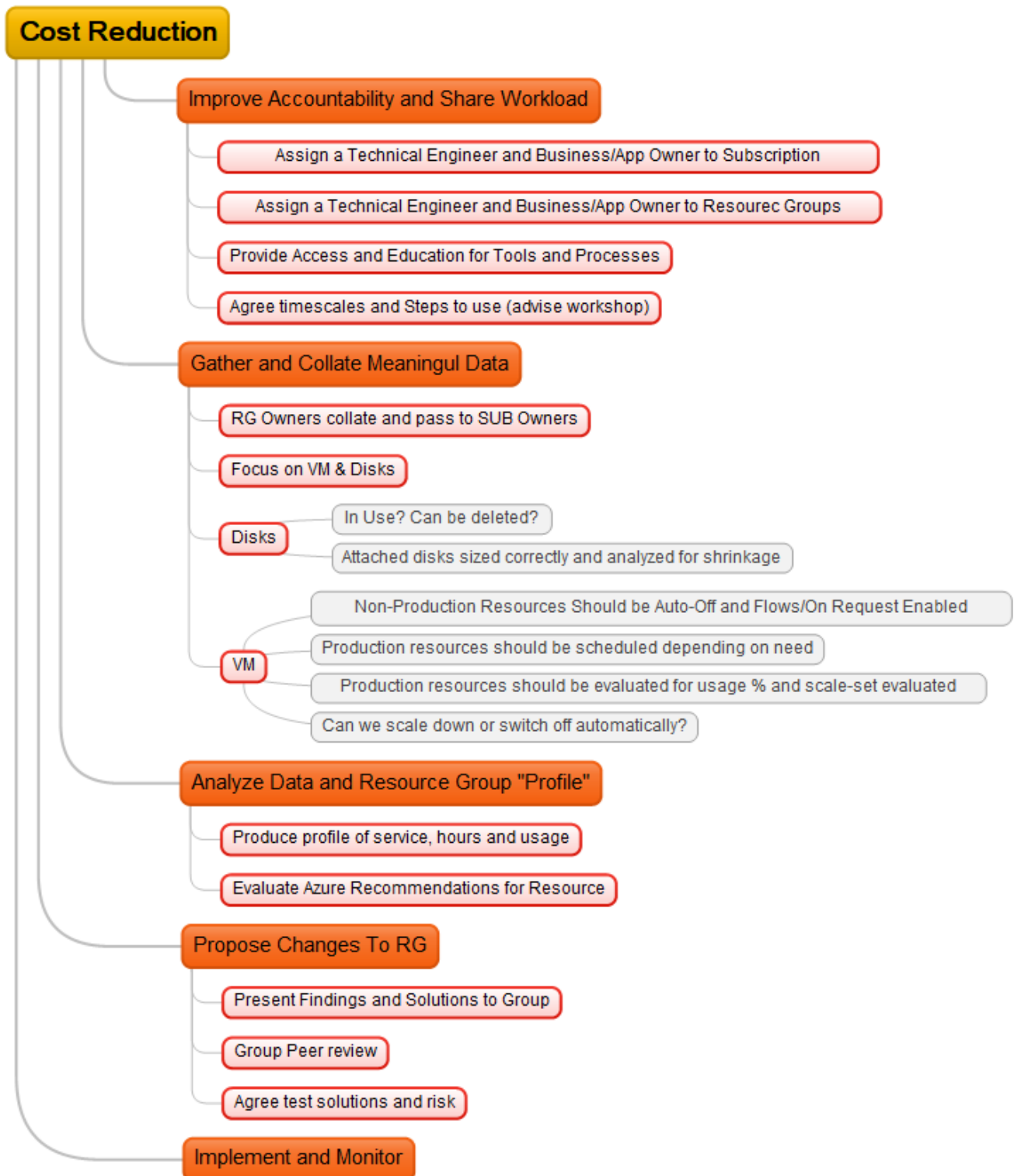
Executive Summary

I would estimate a one week period preparing and ensuring all members are in line with the expectations and timescales

- Create ownership and accountability for resources
- Create working group to share and collaborate
- Deliver expected targets and timescales
- Upskill and Deliver Templates/standards to members

Over a 2nd Week I would expect I would expect the group to come back with first data and learning to discuss as a group and produce an initial proposal for Heads of Department to review and approve

Weeks 3/4 would be planning and reviewing a top target and testing on purpose created test-beds or extraneous machines



High Level Recommendations

Distribute accountability and add Business Partners

The current cost effectiveness and accountability has been placed on a few members of staff that would not have the familiarity with the projects and the cloud platforms without an unfair amount of background work.

BP1 Add Per-subscription Accountability

The Responsibility to gather and collate the resources and costs from Resource Group Owners - and to co-ordinate the efforts to reduce costs should be overall the responsibility of the Subscription Owner. The subscription Owner should be accountable to the vertical business department head and ultimately the head of infrastructure. Depending on the resources deployed within the subscription and the engineer understanding, there should be a business partner allocated to the subscription.

BP2 Add Resource Group Ownership

Assigned by the Subscription Owner. As well as an engineering owner, there should be a business/application owner that understands the users needs and how the application is used over time

BP3 Plan Periodic Review, Knowledge Share and Target Setting

As to be defined timescales for meeting to share the current and desired targets should be set aside so that cost once again becomes a regular and expected reporting feature.

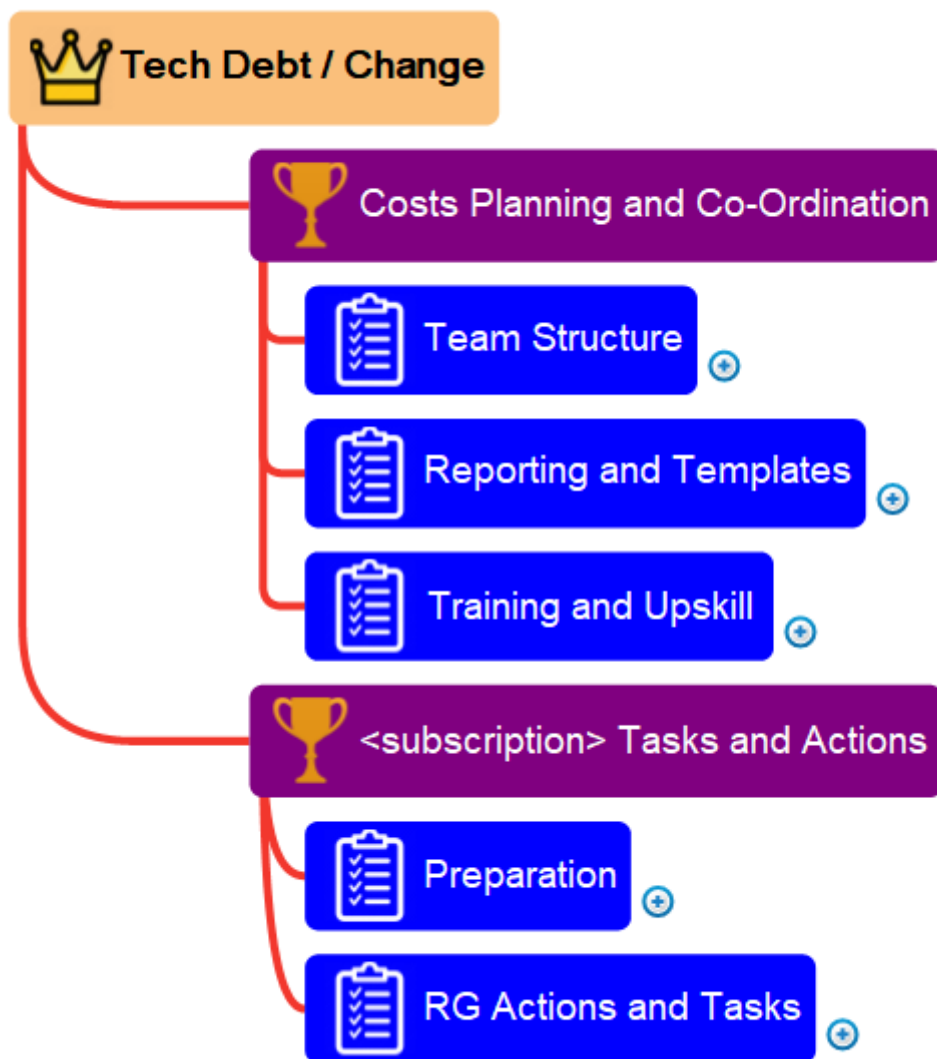
BP4 Plan a Kick Off Review

An initial day should be set aside to take the owners and subscription business partners out of the office to go through the current tools, current costs, to define processes and reporting mechanisms - and to collectively set initial targets. The day should be spent on setting out the overall BP, IN, RP and TA guidance as approved from this report

- Introduction to the subscriptions and owners
- Overview of the tools and features to obtain costs and reports
- Expectations of the business from this process
- Agree processes and discuss risks from certain changes
- Introduce the tools available to engineers (scripted reports) that the business owners may want
- Delivery of template documents and reports so collate the costs and ongoing efforts
- 3 or 4 exercises in taking resource groups and working collectively to look at the potential options and discussing (if split into teams this could address and immediately help introduce savings)

BP5 Refinement into VSTS Tasks etc

Using data from Subscription Reviews, the following structure is recommended



Investigating and Understanding the Data

IN1 Evaluation of Azure Cost Recommendations

Every step to follow, understand and propose levels of implementation of the Azure Recommendations should be done and proposals peer reviewed with the collective Cost Saving group so that we can identify pitfalls and point out errors or mistakes that would inherently exhibit themselves in first iterations

IN2 Identify Always On Resources

Efforts should be made to find and log every instance or resource that is required 24x7 for feeds or overnight processes; These should be flagged for special attention for scale and VM resizing

IN3 Create Low Risk Proposals

Taking learning from IN1, Subscription Owners and Business Partners should find resource groups in their subscription that are very low impact and would require similar remediation as the highest cost group

- resizing of VM instances
- periodic resize of VM instances based on expected demand
- Overnight shutdowns or scale backs

- Weekend Shutdowns
- Plan in a year long schedule that also accounts for every business day that systems are not used

IN4 Create Resource Usage Dashboards

The Resources under a Resource Group should be added to Azure Metrics and have monitor dashboards showing the resources that indicate under/over utilization. This is in preparation for TA where alerts can be configured

Collating and Sharing Data and Recommendations

RP1 Create Consistent reporting dashboards and templates

Using the monitored resources from IN4, Resource Group Owners should make available 1 months, 3 month, 6 month and annual stats for monitored resources on a dashboard

RP2 Improve Application Patterns and Resource Trends

For identified and monitored resource types, triggers or alerts should be set for not only periodic high usage, but indicators of under utilization. This could be such as CPU under 15% for 5 days or other indicators that with a dashboard should show themselves easily.

RP3 Periodic High Usage Understanding

To assist with down-scaling instances as much as possible, periodic spikes and identifying their causes should be looked at so that we can discuss with the business what the trigger was and how we can forecast it for agreed scaling

RP4 Yearly Projection for Usage

Use data to provide a forecast of the infrastructure requirement for availability and compute

- Identify Always-On resources and whether they are scaled correctly
- Identify Business-Hours Only resources and map periods of spike usage
- Identify Resources that can be powered down either nightly, at weekends, public holidays or even eventually in line with the business trends

RP5 Budgets

Understanding current costs per subscription and per resource group, identify ideal target budgets and agree timescales that the budget can go from current costs down to the desired target

Technical Tasks to feed into the process

Once Ownership has been assigned, each resource group should be updated with the following tags

- Engineer : Name
- BusinessOwner : Name
- CostProjectStatus : Review/On hold/high priority etc
- PBI : Link to PBI or PBI Task #

TA1 List Resources in Subscription

Using Azure CLI create or collaborate on scripts to list Resource Groups and their Tags

TA2 Identify and agree resource group owners

TA3 Create Action Groups

Action groups are alert owners for Budget alerts and report distribution

TA4 Create Budgets and Associate to Action Groups

TA5 Enable and Add Resource Metrics

Understand, monitor and track the resources that make the instance or asset high cost. This will normally be the instance size which would mean we should examine primarily the compute and memory usage, followed by disk performance and network capability

TA6 Define Resource Alerts

Define "what normal looks like" for the resource - produce a picture that shows normally the machine uses XX% CPU but spikes to XX% CPU - understand the minimal requirements of the software installed and whether multiple smaller instances that scale in scale-sets would be better

TA7 Identify Potential Actions for resources

- Always on = identify resize options
- Business hours = automated shutdown startup
- Propose Plan per resource group and resource type/name
- Identify scheduled tasks etc precluding desired actions
- technical peer review with 1 engineer and at least 1 lead

TA8 Produce Priority RG list for Maximised Saving

Work with the Owner to decide which RG to target first and how to mitigate risk while working on the group - such as replicating the services in dev to test automation

- Implementation for each recommendation should be carried out on a resource group by resource group basis, starting at the most expensive and dropping down after completion
- Only one implementation should be undertaken at any time across all resource groups else a failure could divert engineers needed for the delivery of cost savings.
- Automated action should be - where reasonable - stepped through manually once and then watched when running for a number of iterations
- an agreed action plan for peer review, assistance, validation, roll-forward or in worst-case roll-back should there be an issue.
- implementation should be documented and coordinated by the Business Contact and technical work left to engineers in the event of any issue.

Tools and Guidance From Azure

[Azure Costs Management and Billing](#) 

Subscription by Subscription Azure Guidance

The top 4 highest cost subscriptions have been chosen to show the savings indicated by the Azure Cost Monitor Recommendations












Subscription	Azure Cost Recommendation Saving Guidance	Other
Operational IaaS	~£79,000	
Operations Engineering	~£38,000	
Data Engineering	~£12,000	
Operational PaaS	~£7,000	

Estimated potential savings over a year with the Azure Tools : £136,000

[pknw1 Core PaaS Dev & Test](#) [Azure Core PowerShell Sandbox](#) [pknw1 Core IaaS Dev & Test](#) [pknw1 Core Operational IaaS](#) [pknw1 Core Operational PaaS](#) [pknw1 Operations Engineering](#) [pknw1 Network Comms](#) [pknw1 Commercial Engineering](#) [pknw1 Data Engineering](#) [pknw1 Core Engineering](#) [pknw1 Data Engineering Dev Test](#) [Visual Studio Professional](#) [pknw1 Commercial Engineering Dev Test](#)

Considerations when examining resources

Examining the data from the Operational IaaS subscription, we can see clearly that the focus areas should be as below

Jun 17		
	microsoft.compute/virtualmachines	£14,330.82
	microsoft.compute/disks	£13,202.41
	microsoft.recoveryservices/vaults	£3,714.70
	visualstudioonline/account	£1,682.56
	microsoft.storage/storageaccounts	£896.72
	microsoft.operationalinsights/workspaces	£726.58
	microsoft.network/expressroutecircuits	£432.00
	microsoft.network/virtualnetworkgateways	£106.20
	microsoft.web/serverfarms	£26.28
	microsoft.datafactory/datafactories	£11.88
	Others	£26.75
Jun 19 Jun 21 Jun 23 Jun 25		

Virtual Machines

Consideration	A	B
Is the VM active in a product in production	If not, it should immediately be flagged for appropriate powerdown	see Starting VMs by Users ☑
Is the VM required for always-on	If yes, examine whether the scale (instance size) is correct or whether a central service machine could take out of hours roles	
Can the VM be powered down overnight?	due diligence then co-ordinate test shutdown and poweron	
Can the VM be powered down at other times?	see above	
IS the VM size applicable? Balance CPU/Memory etc	examine long term stats to see if a different machine size would be better.	
Could the VM be replicated in smaller instances sizes to scale?		
Can the service be containerized or run in PaaS		
Can the service be provided by another system?	many small services run on separate machines but where possible we should have a batch processor to handle menial out of hours or feed tasks	
Are the local resources frequently or always under utilized (say 20% or less)	examine the size of the machine and identify scale options	
Are resources PAYG or Reserved	carefully examine and discuss cost savings by switching either from or to managed instances	
Can the OS on DEV or Test instances be switched to Centos?		

**to be updated with new scale-sets and low-priority instances for dev and always-on

Disks

Consideration	A	B
Are disks attached to a VM or orphaned?	Check for all orphaned resources and ensure not in use.	Tag with a for-deletion tag and agree a date to move the resource to a holding RG or delete
Have orphaned disks been examined for data to be retained?	Confirm with product owner disk contents	attach to temp VM and validate
Identified for deletion disks should be confirmed with DPO regarding retention of any data	if data here is customer data or relates to data gleaned from, ensure that is is not required to be held by regulation	
Attached disks should be confirmed as reasonably sized	Check size and usage (df -kh) and how size has changed over time and consider whether to downgrade disk	
Disks and mounts should be excluded from active access other than by products	In Azure we pay for disk access. Examine logs to ensure that only applications access it and it is not persistently scanned etc	

Vaults

This section was an unexpectedly high % cost and no research has been conducted as yet . to be completed

Consideration	A	B

Resources and Links

Azure Tools

- [Microsoft Pricing Calculator](#) https://portal.azure.com/#blade/Microsoft_Azure_Billing/ModernBillingMenuBlade/Overview
- Azure Cost Centre Per Subscription

[pknw1 Core PaaS Dev & Test](#) [Azure Core PowerShell Sandbox](#) [pknw1 Core IaaS Dev & Test](#) [pknw1 Core Operational IaaS](#) [pknw1 Core Operational PaaS](#) [pknw1 Operations Engineering](#) [pknw1 Network Comms](#) [pknw1 Commercial Engineering](#) [pknw1 Data Engineering](#) [pknw1 Core Engineering](#) [pknw1 Data Engineering Dev Test](#) [Visual Studio Professional](#) [pknw1 Commercial Engineering Dev Test](#)

Azure Education

<https://docs.microsoft.com/en-us/azure/virtual-machines/windows/reserved-vm-instance-size-flexibility> <https://azure.microsoft.com/en-gb/blog/general-availability-of-instance-size-flexibility-for-azure-reserved-virtual-machine-instances/> <https://azure.microsoft.com/en-us/global-infrastructure/services/?products=virtual-machines®ions=non-regional,europe-west> <https://docs.microsoft.com/en-us/azure/virtual-machine-scale-sets/overview> <https://azure.microsoft.com/en-gb/blog/low-priority-scale-sets/>

Blogs

<https://briantjackett.com/2017/10/15/using-microsoft-flow-to-start-and-stop-a-set-of-azure-vms/>

Pluralsight

- [Channel with applicable courses](#)

azure/costs
Courses to help VBL Business Partners and Engineers identify and manage costs effectively
Paul Kelleher • 6h 30m • Company - Vanquis Bank Ltd • [Edit Channel](#)

[+ Add content](#) [Add members](#) [PK](#)

- Managing Microsoft Azure Subscriptions**
Course • Daniel Lachance • Beginner • Aug 10, 2018 • 1h 58m
- Estimating One-time and Recurring Costs for Microsoft Azure**
Course • Phil Evershed • Intermediate • Dec 10, 2018 • 1h 38m
- Optimizing Consumption Strategy in Microsoft Azure**
Course • James Bannan • Intermediate • Sep 14, 2018 • 2h 54m

```
# Login-AzureRMaccount
# Get-AzureRmSubscription

$customrole = Get-AzureRmRoleDefinition "Virtual Machine Contributor"
$customrole.Id = $null
$customrole.Name = "Virtual Machine Starter"
$customrole.Description = "Provides the ability to start a virtual machine."

$roleactions = {}
$assignablescope = "/subscriptions/048b82ac-4519-403b-ab05-6b4305502109"

PS C:\WINDOWS\system32>
```

AZ Cli Commands

```
az account list --o table
```

A few accounts are skipped as they don't have 'Enabled' state. Use '--all' to display them.

Name	CloudName	SubscriptionId	State	IsDefault
pknw1 Core PaaS Dev & Test	AzureCloud	fef345bd-a212-4f7c-8c6b-82556b67851c	Enabled	False
Azure Core PowerShell Sandbox	AzureCloud	c56f4a07-7ef3-4ce1-bd05-09da7ddf6a87	Enabled	False
pknw1 Core IaaS Dev & Test	AzureCloud	5a1bd260-1de0-459f-a668-56793dadb16	Enabled	True
pknw1 Core Operational IaaS	AzureCloud	6f72b0c6-c95d-4660-88e3-8df1f3239dac	Enabled	False
pknw1 Core Operational PaaS	AzureCloud	d4a5880d-662d-4192-a74d-99f65ba5e417	Enabled	False
pknw1 Operations Engineering	AzureCloud	2fc359d1-59a4-4545-bc43-3ac5647eb65d	Enabled	False
pknw1 Network Comms	AzureCloud	e62e545d-2d07-4b8f-9179-c73762db35a8	Enabled	False
pknw1 Commercial Engineering	AzureCloud	9a191abd-e12a-4f6c-af6c-d1c8cf17df84	Enabled	False
pknw1 Data Engineering	AzureCloud	e12f7125-3de2-40ec-96fc-52e43edf4fffb	Enabled	False
pknw1 Core Engineering	AzureCloud	38bcc752-717a-4752-b237-3382e5071de6	Enabled	False
pknw1 Data Engineering Dev Test	AzureCloud	3886146d-b684-46bd-8216-64cfed6ad0db	Enabled	False
Visual Studio Professional	AzureCloud	08b22955-2f20-4207-8e30-5601a93862f7	Enabled	False
pknw1 Commercial Engineering Dev Test	AzureCloud	6ba5a5d7-1bfe-478d-b549-92bf8abb56f3	Enabled	False

```
az account list --o tsv --query '[][id,name]' | while read -r "d"; do id=$(echo "${d}" | awk -F'\t' '{print
```

```
#!/bin/bash
#az resource list --subscription $1 --resource-type=Microsoft.Compute/virtualMachines -o tsv
az group list --subscription $1 --query [].name -o tsv | while read -r RG;
do
  echo Resource Group : $RG
  ## in the resource group, list all Virtual Machine IDs
  az resource list --subscription $1 -g $RG --query [].id --resource-type=Microsoft.Compute/virtualMachines

  echo VM CPU Average for Resource ID : $id
  ## output the CPU Average every 6 hours for the VM between the dates
  az resource show --ids $id --query properties.hardwareProfile.vmSize -o tsv
  az monitor metrics list --resource $id -o table --aggregation Average Maximum --interval PT6H --start-time
  echo " "
  #az monitor metrics list --resource $id -o table --aggregation Maximum --interval PT6H --start-time
  echo " "
  echo "-----"
  echo " "
done

echo " "

echo "Orphaned Disks"
az disk list --subscription $1 -g $RG | egrep 'id|managedBy' | grep -B1 null | grep id
echo " "
done
```

```
cat ../subscriptions.txt | while read -r id; do echo -----; echo $(az acco
```

17/06/19 - PK - [orphaned-disks.txt](#)

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