

## Chapter 2: Getting Started with the Azure Cloud

```
~ >>> az group list --output jsonc
[
  {
    "id": "/subscriptions/88525bff-081c-45ad-ba31-
oud-shell-storage-westeuropa",
    "location": "westeuropa",
    "managedBy": null,
    "name": "cloud-shell-storage-westeuropa",
    "properties": {
      "provisioningState": "Succeeded"
    },
    "tags": null
  }
]
```

```
~ >>> az group list --output tsv
/subscriptions/88525          le69/resourceGroups/clo
storage-westeuropa          westeuropa                None    cloud-shell-storage-we
one
```

---

```
~ >>> az group list --output table
```

Name	Location	Status
-----	-----	-----
cloud-shell-storage-westeuropa	westeuropa	Succeeded

```
PS /Users/frederik> Login-AzureRmAccount
```

```
WARNING: To sign in, use a web browser to open the page https://microsoft.com/devicelogin and enter the code B6DSM5FWE to authenticate.
```

```
Account          : frederik.vos@linvirt.nl
SubscriptionName : Pay-As-You-Go
SubscriptionId    : 88
TenantId         : 0491
Environment      : AzureCloud
```

```
PS /Users/frederik> New-AzureRmADServicePrincipal -DisplayName linvirt1 -Password $pass
```

```
ServicePrincipalNames : {d7d2711b-a1e1-496d-96a6-6faa8f71b12b, http://linvirt1}
ApplicationId         : d7d2711b-a1e1-496d-96a6-6faa8f71b12b
DisplayName           : linvirt1
Id                   : 39b32819-bd7b-4224-85ef-13f928847597
Type                  : ServicePrincipal
```

---

```
PS /Users/frederik> New-AzureRmVM -Name "UbuntuVM" -Location westus `
>> -ResourceGroupName MyResource1 -ImageName UbuntuLTS `
>> -Size Standard_B1S
```

```
cmdlet New-AzureRmVM at command pipeline position 1
```

```
Supply values for the following parameters:
```

```
Credential
```

```
User: student
```

```
Password for user student: *****
```

```
█
Creating Azure resources
```

```
11% |
```

```
[ooooooooo
```

```
] 
```

```
Creating UbuntuVM virtual machine.
```

```
▶~> ssh-keygen
```

```
Generating public/private rsa key pair.
```

```
Enter file in which to save the key (/Users/frederik/.ssh/id_rsa):
```

```
Enter passphrase (empty for no passphrase):
```

```
Enter same passphrase again:
```

```
Your identification has been saved in /Users/frederik/.ssh/id_rsa.
```

```
Your public key has been saved in /Users/frederik/.ssh/id_rsa.pub.
```

---

## Chapter 3: Basic Linux Administration

```
alias cp='cp -i'  
alias egrep='egrep --color=auto'  
alias fgrep='fgrep --color=auto'  
alias grep='grep --color=auto'  
alias l.='ls -d .* --color=auto'  
alias ll='ls -l --color=auto'  
alias ls='ls --color=auto'  
alias mc='. /usr/libexec/mc/mc-wrapper.sh'  
alias mv='mv -i'  
alias rm='rm -i'
```



```
alias cp='cp -i'
alias egrep='egrep --color=auto'
alias fgrep='fgrep --color=auto'
alias grep='grep --color=auto'
alias l.='ls -d .* --color=auto'
alias ll='ls -l --color=auto'
alias ls='ls --color=auto'
alias mc='. /usr/libexec/mc/mc-wrapper.sh'
alias mv='mv -i'
alias rm='rm -i'
```

```
[linvirt@CentOS-01 ~]$ printenv PATH
/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/home/linvirt/.local/bin:/home/linvirt/bin
```

The table below shows the section numbers of the manual followed by the types of pages they contain.

0	Header files (usually found in /usr/include)
1	Executable programs or shell commands
2	System calls (functions provided by the kernel)
3	Library calls (functions within program libraries)
4	Special files (usually found in /dev)
5	File formats and conventions eg /etc/passwd
6	Games
7	Miscellaneous (including macro packages and conventions), e.g. man(7), groff(7)
8	System administration commands (usually only for root)
9	Kernel routines [Non standard]

---

```
localtime (5) - Local timezone configuration file
ntp.conf (5) - Network Time Protocol (NTP) daemon configuration file ...
systemd.timer (5) - Timer unit configuration
time.conf (5) - configuration file for the pam_time module
timesyncd.conf (5) - Network Time Synchronization configuration files
timesyncd.conf.d (5) - Network Time Synchronization configuration files
```

```
[linvirt@CentOS-01 ~]$ cat /etc/shells
/bin/sh
/bin/bash
/sbin/nologin
/usr/bin/sh
/usr/bin/bash
/usr/sbin/nologin
/bin/tcsh
/bin/csh
```

```
[root@server1 student]# grep -B1 umask /etc/profile
# By default, we want umask to get set. This sets it for login shell
--
if [ $UID -gt 199 ] && [ "`/usr/bin/id -gn`" = "`/usr/bin/id -un`" ]; then
    umask 002
else
    umask 022
```

---

```
[root@localhost ~]# tree -L 1 /
/
├── bin -> usr/bin
├── boot
├── dev
├── etc
├── home
├── lib -> usr/lib
├── lib64 -> usr/lib64
├── media
├── mnt
├── opt
├── proc
├── root
├── run
├── sbin -> usr/sbin
├── srv
├── sys
├── tmp
├── usr
└── var
```

---

```
[root@localhost ~]# tree -L 1 /usr
/usr
├── bin
├── etc
├── games
├── include
├── lib
├── lib64
├── libexec
├── local
├── sbin
├── share
├── src
└── tmp -> ../var/tmp
```

---

```
[root@localhost ~]# tree -L 1 /usr/local
/usr/local
```

```
├── bin
├── etc
├── games
├── include
├── lib
├── lib64
├── libexec
├── sbin
├── share
└── src
```

```
[student@server1 ~]$ findmnt
```

TARGET	SOURCE	FSTYPE	OPTIONS
/	/dev/mapper/centos-root	xfs	rw,relatime,seclabel,a
├─/sys	sysfs	sysfs	rw,nosuid,nodev,noexec
│ └─/sys/kernel/security	securityfs	security	rw,nosuid,nodev,noexec
│ └─/sys/fs/cgroup	tmpfs	tmpfs	ro,nosuid,nodev,noexec
│ │ └─/sys/fs/cgroup/systemd	cgroup	cgroup	rw,nosuid,nodev,noexec
│ │ └─/sys/fs/cgroup/blkio	cgroup	cgroup	rw,nosuid,nodev,noexec
│ │ └─/sys/fs/cgroup/hugetlb	cgroup	cgroup	rw,nosuid,nodev,noexec

```
[student@server1 ~]$ findmnt -D
```

SOURCE	FSTYPE	SIZE	USED	AVAIL	USE%	TARGET
devtmpfs	devtmpfs	477M	0	477M	0%	/dev
tmpfs	tmpfs	487.6M	0	487.6M	0%	/dev/shm
tmpfs	tmpfs	487.6M	6.8M	480.9M	1%	/run
tmpfs	tmpfs	487.6M	0	487.6M	0%	/sys/fs/cgroup
/dev/mapper/centos-root	xfs	12G	1.4G	10.6G	12%	/

```
[root@localhost ~]# cd /proc/$$
```

```
[root@localhost 1226]# ls
```

attr	cpuset	limits	net	projid_map	stat
autogroup	<b>cwd</b>	loginuid	<b>ns</b>	<b>root</b>	statm
auxv	environ	<b>map_files</b>	numa_maps	sched	status
cgroup	<b>exe</b>	maps	oom_adj	schedstat	syscall
clear_refs	<b>fd</b>	mem	oom_score	sessionid	<b>task</b>
cmdline	<b>fdinfo</b>	mountinfo	oom_score_adj	setgroups	timers
comm	gid_map	mounts	pagemap	smaps	uid_map
coredump_filter	io	mountstats	personality	stack	wchan

```
[root@localhost ~]# ps -ef | head -5
```

UID	PID	PPID	C	STIME	TTY	TIME	CMD
root	1	0	0	02:15	?	00:00:01	/usr/lib/systemd/systemd --swi
tched-root	--system	--deserialize	21				
root	2	0	0	02:15	?	00:00:00	[kthreadd]
root	3	2	0	02:15	?	00:00:00	[ksoftirqd/0]
root	5	2	0	02:15	?	00:00:00	[kworker/0:0H]

```
[root@localhost ~]# ps aux | head -5
```

USER	PID	%CPU	%MEM	VSZ	RSS	TTY	STAT	START	TIME	COMMAND
root	1	0.0	0.6	128168	6836	?	Ss	02:15	0:01	/usr/lib/syste
md/systemd	--switched-root	--system	--deserialize	21						
root	2	0.0	0.0	0	0	?	S	02:15	0:00	[kthreadd]
root	3	0.0	0.0	0	0	?	S	02:15	0:00	[ksoftirqd/0]
root	5	0.0	0.0	0	0	?	S<	02:15	0:00	[kworker/0:0H]

```
top - 03:12:45 up 57 min, 5 users, load average: 0.00, 0.01, 0.05
Tasks: 104 total, 1 running, 103 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 0.3 sy, 0.0 ni, 99.7 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
KiB Mem : 998636 total, 668612 free, 165676 used, 164348 buff/cache
KiB Swap: 2097148 total, 2097148 free, 0 used. 657180 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
2042	root	20	0	157584	2132	1500	R	0.3	0.2	0:00.03	top
1	root	20	0	128168	6836	4068	S	0.0	0.7	0:01.95	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthreadd
3	root	20	0	0	0	0	S	0.0	0.0	0:00.06	ksoftirqd/0

```
PS /Users/frederik> New-AzureRmVM -Name "CentOS-01" -Location westus `
>> -ResourceGroupName MyResource1 -ImageName CentOS `
>> -Size Standard_B1S
```

```
cmdlet New-AzureRmVM at command pipeline position 1
```

```
Supply values for the following parameters:
```

```
Credential
```

```
User: linvirt
```

```
Password for user linvirt: *****
```

```
[linvirt@CentOS-01 ~]$ sudo getent passwd linvirt
[sudo] password for linvirt:
linvirt:x:1000:1000:~/home/linvirt:/bin/bash
```

```
[linvirt@CentOS-01 ~]$ sudo getent shadow linvirt
linvirt:$
1:17645:0:99999:7:::
```

---

```
[linvirt@CentOS-01 ~]$ chage -l linvirt
Last password change           : Apr 24, 2018
Password expires               : never
Password inactive              : never
Account expires                : never
Minimum number of days between password change : 0
Maximum number of days between password change : 99999
Number of days of warning before password expires : 7
```

```
[linvirt@CentOS-01 ~]$ sudo chfn linvirt
[sudo] password for linvirt:
Changing finger information for linvirt.
Name []: Jane Roe
Office []: 112
Office Phone []: 00-01
Home Phone []: 00-02
```

```
[linvirt@CentOS-01 ~]$ loginctl list-sessions
  SESSION      UID USER      SEAT
    43         1001 student
    42         1000 linvirt

2 sessions listed.
[linvirt@CentOS-01 ~]$ loginctl show-session 43
Id=43
User=1001
Name=student
Timestamp=Tue 2018-04-24 12:16:08 UTC
TimestampMonotonic=19702968317
VTNr=0
Remote=yes
RemoteHost=77.95.96.78
Service=sshd
```



---

student (1001)

Since: Tue 2018-04-24 12:16:08 UTC; 14min ago

State: active

Sessions: \*43

Unit: user-1001.slice

└─session-43.scope

├─37090 sshd: student [priv]

├─37097 sshd: student@pts/1

├─37098 -bash

├─37475 man man

└─37487 less -s

---

## Chapter 4: Managing Azure

```
PS /Users/frederik> Get-AzureRMStorageAccount | Select StorageAccountName, Location

StorageAccountName Location
-----
chapter42585        westus

PS /Users/frederik> Get-AzureRMStorageAccountKey -ResourceGroupName $myRG -Name chapter42585 | Select
t KeyName, Value

KeyName Value
-----
key1     A5Jd46nZattrWNUYky [REDACTED] ==
key2     u2vr1BmF7Y4DEzv/JM [REDACTED] ==
```

```
PS /Users/frederik> $diskconfig

ResourceGroupName :
ManagedBy        :
Sku               : Microsoft.Azure.Management.Compute.Models.DiskSku
Zones            :
TimeCreated       :
OsType           : Linux
CreationData      : Microsoft.Azure.Management.Compute.Models.CreationData
DiskSizeGB       : 5
EncryptionSettings :
ProvisioningState :
Id               :
Name             :
Type            :
Location         : westus
Tags            :
```

```
PS /Users/frederik> $Disk01
```

```
ResourceGroupName : chapter4
ManagedBy        :
Sku               : Microsoft.Azure.Management.Compute.Models.DiskSku
Zones            :
TimeCreated      : 08/09/2018 08:27:06
OsType           : Linux
CreationData     : Microsoft.Azure.Management.Compute.Models.CreationData
DiskSizeGB       : 5
EncryptionSettings :
ProvisioningState : Succeeded
Id               : /subscriptions/88[REDACTED]69/resourceG
                 : oviders/Microsoft.Compute/disks/Disk01
Name             : Disk01
Type             : Microsoft.Compute/disks
Location         : westus
Tags             : {}
```

```
PS /Users/frederik> Add-AzureRmVMDataDisk -VM $myVM -Name Disk01 `
>> -ManagedDiskId $Disk01.Id -Lun 1 -CreateOption Attach
```

```
ResourceGroupName : chapter4
Id                : /subscriptions/88[REDACTED]69/resourceGr
                 : oviders/Microsoft.Compute/virtualMachines/ubuntu01
VmId              : be7dd051-1adc-4b3b-9484-f0b86b895ea4
Name              : ubuntu01
Type              : Microsoft.Compute/virtualMachines
Location          : westus
Tags              : {}
HardwareProfile   : {VmSize}
NetworkProfile    : {NetworkInterfaces}
OSProfile         : {ComputerName, AdminUsername, LinuxConfiguration, Secrets}
ProvisioningState : Succeeded
StorageProfile    : {ImageReference, OsDisk, DataDisks}
```

---

```
PS /Users/frederik> Update-AzureRmVM -ResourceGroupName $myRG -VM $myVM
```

```
RequestId IsSuccessStatusCode StatusCode ReasonPhrase
```

```
-----  
True OK OK
```

```
PS /Users/frederik> $(Get-AzureRmVM -Name $myTestVM -ResourceGroupName $myRG).StorageProfile.DataDisks
```

```
Name : Disk01  
DiskSizeGB : 5  
Lun : 1  
Caching : None  
CreateOption : Attach  
SourceImage :  
VirtualHardDisk :
```

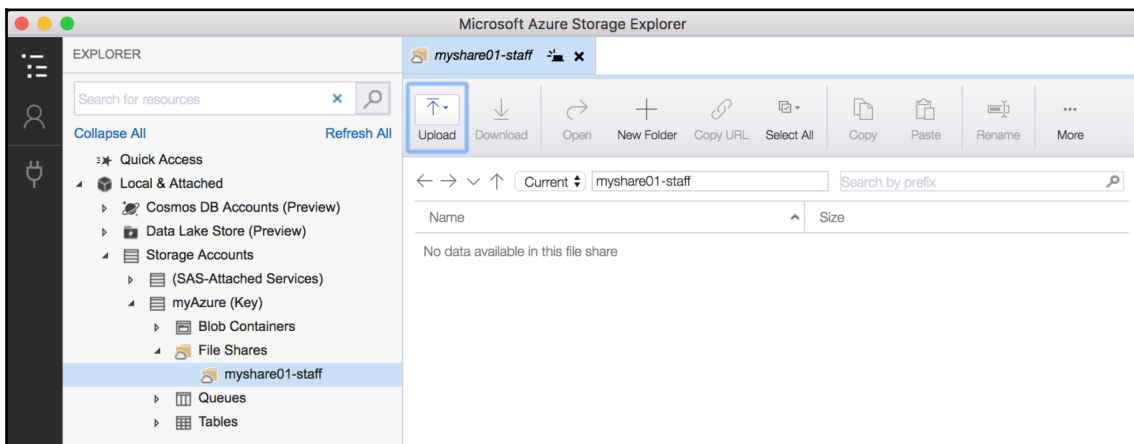
```
PS /Users/frederik> $myShare01
```

```
File End Point: https://chapter42585.file.core.windows.net/
```

```
Name LastModified  
----  
myshare01-staff 08/09/2018...
```

```
PS /Users/frederik> (Get-AzureStorageShare -Context $mySA.Context).Uri
```

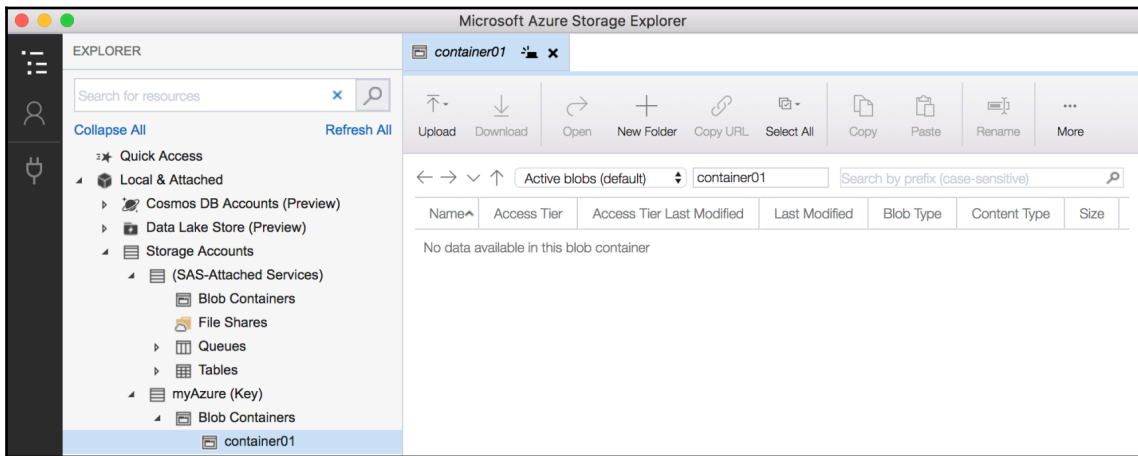
```
AbsolutePath      : /myshare01-staff
AbsoluteUri       : https://chapter42585.file.core.windows.net/myshare01-staff
LocalPath         : /myshare01-staff
Authority         : chapter42585.file.core.windows.net
HostNameType     : Dns
IsDefaultPort    : True
IsFile           : False
IsLoopback       : False
PathAndQuery     : /myshare01-staff
Segments         : {/, myshare01-staff}
IsUnc            : False
Host             : chapter42585.file.core.windows.net
Port             : 443
Query            :
Fragment         :
Scheme          : https
OriginalString   : https://chapter42585.file.core.windows.net:443/myshare01-staff
DnsSafeHost      : chapter42585.file.core.windows.net
IdnHost         : chapter42585.file.core.windows.net
IsAbsoluteUri   : True
UserEscaped     : False
UserInfo        :
```



```
PS /Users/frederik> $myContainer
```

Blob End Point: <https://chapter42585.blob.core.windows.net/>

Name	PublicAccess	LastModified
-----	-----	-----
container01	Blob	2018-08-09 08:54:35Z



---

```
PS /Users/frederik> $myVnet
```

```
Name                : MyVirtualNetwork
ResourceGroupName   : chapter4
Location            : westus
Id                  : /subscriptions/88[REDACTED]/resources/
                    : Microsoft.Network/virtualNetworks/MyVirtualNetwork
Etag                : W/"a9e[REDACTED]-15a75d7aec18"
ResourceGuid        : 9ccc6b48-95ce-47f2-bea1-90a0dbb8e5ad
ProvisioningState   : Succeeded
Tags                :
AddressSpace        : {
                    :   "AddressPrefixes": [
                    :     "10.0.0.0/16"
                    :   ]
                    : }
DhcpOptions         : {}
Subnets            : []
VirtualNetworkPeerings : []
EnableDdosProtection : false
DdosProtectionPlan  : null
EnableVmProtection  : false
```

---

```
PS /Users/frederik> $myVnet
```

```
Name : MyVirtualNetwork
ResourceGroupName : chapter4
Location : westus
Id : /subscriptions/88525bff-081c-45ad-
    oviders/Microsoft.Network/virtualN
Etag : W/"a9efc831-f2d0-4ae5-bb87-15a75d7
ResourceGuid : 9ccc6b48-95ce-47f2-bea1-90a0dbb8e5
ProvisioningState : Succeeded
Tags :
AddressSpace : {
    "AddressPrefixes": [
        "10.0.0.0/16"
    ]
}
DhcpOptions : {}
Subnets : [
    {
        "Name": "MySubnet",
        "AddressPrefix": "10.0.1.0/24"
    }
]
VirtualNetworkPeerings : []
EnableDdosProtection : false
DdosProtectionPlan : null
EnableVmProtection : false
```



---

```
PS /Users/frederik> Get-AzureRmVirtualNetworkSubnetConfig -VirtualNetwork $myVnet
```

```
Name           : MySubnet
Id              :
Etag           :
ProvisioningState :
AddressPrefix   : 10.0.1.0/24
IpConfigurations : null
ResourceNavigationLinks : null
NetworkSecurityGroup : null
RouteTable     : null
ServiceEndpoints : null
```

```

Name : MyVirtualNetwork
ResourceGroupName : chapter4
Location : westus
Id : /subscriptions/88525bff-081c-45ad-ba31-4e79cd539e69/resourceGr
providers/Microsoft.Network/virtualNetworks/MyVirtualNetwork
Etag : W/"e3ae26e5-a72f-4d23-8cc7-abf75c4df92f"
ResourceGuid : 9ccc6b48-95ce-47f2-bea1-90a0dbb8e5ad
ProvisioningState : Succeeded
Tags :
AddressSpace : {
  "AddressPrefixes": [
    "10.0.0.0/16"
  ]
}
DhcpOptions : {
  "DnsServers": []
}
Subnets : [
  {
    "Name": "MySubnet",
    "Etag": "W/"e3ae26e5-a72f-4d23-8cc7-abf75c4df92f\"",
    "Id": "/subscriptions/88525bff-081c-45ad-ba31-4e79cd539e69
chapter4/providers/Microsoft.Network/virtualNetworks/MyVirtual
MySubnet",
    "AddressPrefix": "10.0.1.0/24",
    "IpConfigurations": [],
    "ResourceNavigationLinks": [],
    "NetworkSecurityGroup": {
      "Id": "/subscriptions/88525bff-081c-45ad-ba31-4e79cd539e69
s/chapter4/providers/Microsoft.Network/networkSecurityGroups/m
    },
    "ServiceEndpoints": [],
    "ProvisioningState": "Succeeded"
  }
]
VirtualNetworkPeerings : []
EnableDdosProtection : false
DdosProtectionPlan : null
EnableVmProtection : false

```

---

```
PS /Users/frederik> $myNSG | select SecurityRules
```

```
SecurityRules
```

```
-----
```

```
{SSH}
```

```
PS /Users/frederik> $myNSG.SecurityRules
```

```
Name : SSH
Id :
Etag :
ProvisioningState :
Description : Allow SSH
Protocol : Tcp
SourcePortRange : {*}
DestinationPortRange : {22}
SourceAddressPrefix : {Internet}
DestinationAddressPrefix : {*}
SourceApplicationSecurityGroups : null
DestinationApplicationSecurityGroups : null
Access : Allow
Priority : 100
Direction : Inbound
```

---

```
PS /Users/frederik> $pip
```

```
Name : loa979720432
ResourceGroupName : chapter4
Location : westus
Id : /subscriptions/88525bff-081c-45ad-ba31-4e79
providers/Microsoft.Network/publicIPAddress
Etag : W/"28b8d5ad-6c90-4b8e-b113-3f9404e61afa"
ResourceGuid : 664c331f-5feb-40d0-85e8-d5df32495b26
ProvisioningState : Succeeded
Tags :
PublicIpAllocationMethod : Dynamic
IpAddress : Not Assigned
PublicIpAddressVersion : IPv4
IdleTimeoutInMinutes : 4
IpConfiguration : null
DnsSettings : null
Zones : {}
Sku : {
      "Name": "Basic"
    }
IpTags : []
```

---

```
PS /Users/frederik> $nic.IpConfigurations
```

```
Name : ipconfig1
Id : /subscriptions/88525bff-081c-45ad-ba31-4
ups/chapter4/providers/Microsoft.Network
c/ipConfigurations/ipconfig1
Etag : W/"45b8a6f2-59a6-447e-973a-5133018eccc4"
Primary : True
ProvisioningState : Succeeded
PrivateIpAddress : 10.0.1.4
PrivateIpAddressVersion : IPv4
PrivateIpAllocationMethod : Dynamic
Subnet : {
  "Id": "/subscriptions/88525bff-081c-45
sourceGroups/chapter4/providers/Microsof
ks/MyVirtualNetwork/subnets/MySubnet",
  "ResourceNavigationLinks": [],
  "ServiceEndpoints": []
}
PublicIpAddress : {
  "IpTags": [],
  "Zones": [],
  "Id": "/subscriptions/88525bff-081c-45
sourceGroups/chapter4/providers/Microsof
sses/loa1539965299"
}
LoadBalancerBackendAddressPools : []
ApplicationGatewayBackendAddressPools : []
LoadBalancerInboundNatRules : []
ApplicationSecurityGroups : []
```

---

## Chapter 5: Advanced Linux Administration

```
[linvirt@centos ~]$ rpm -qa | grep openssh
openssh-server-7.4p1-13.el7_4.x86_64
openssh-7.4p1-13.el7_4.x86_64
openssh-clients-7.4p1-13.el7_4.x86_64
[linvirt@centos ~]$ rpm -qc openssh-server
/etc/pam.d/sshd
/etc/ssh/sshd_config
/etc/sysconfig/ssh
[linvirt@centos ~]$ rpm -qd openssh-server
/usr/share/man/man5/moduli.5.gz
/usr/share/man/man5/sshd_config.5.gz
/usr/share/man/man8/sftp-server.8.gz
/usr/share/man/man8/sshd.8.gz
[linvirt@centos ~]$ rpm -qf /etc/ssh/sshd_config
openssh-server-7.4p1-13.el7_4.x86_64
[linvirt@centos ~]$ rpm -V openssh-server
..?....T.  c /etc/ssh/sshd_config
..?.....  c /etc/sysconfig/ssh
```

```
linvirt@debian:~$ dpkg -l xxd
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Inst/Conf-files/Unpacked/half-conf/Half-inst/trig-aWait/Trig-pend
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)
||/ Name          Version          Architecture Description
+++-----
ii  xxd              2:8.0.0197-4    amd64         tool to make (or reverse) a hex d
```

---

```
linvirt@debian:~$ dpkg -l xxd
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Inst/Conf-files/Unpacked/halF-conf/Half-inst/trig-aWait/Trig-pend
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)
||/ Name          Version          Architecture Description
+++=====
ii  xxd              2:8.0.0197-4    amd64          tool to make (or reverse) a hex d
```

```
linvirt@suse01:~> sudo cnf finger
```

```
The program 'finger' can be found in the following package:
```

```
* finger [ path: /usr/bin/finger, repository: zypp (openSUSE-Leap-42.3-0ss) ]
```

```
Try installing with:
```

```
zypper install finger
```

```
linvirt@suse01:~> sudo zypper install finger
```

```
Loading repository data...
```

```
Reading installed packages...
```

```
Resolving package dependencies...
```

```
The following NEW package is going to be installed:
```

```
finger
```

```
1 new package to install.
```

```
Overall download size: 18.9 KiB. Already cached: 0 B. After the operation,  
additional 31.6 KiB will be used.
```

```
Continue? [y/n/...? shows all options] (y): █
```

---

```
[linvirt@CentOS-01 ~]$ sudo udevadm info -p /sys/class/net/eth*
P: /devices/LNXSYSTM:00/device:00/PNP0A03:00/device:08/VMBUS:01/vmbus_15/net/eth0
E: DEVPATH=/devices/LNXSYSTM:00/device:00/PNP0A03:00/device:08/VMBUS:01/vmbus_15/net/eth0
E: ID_NET_DRIVER=hv_netvsc
E: ID_NET_NAME_MAC=enx000d3a3ae27f
E: ID_OUI_FROM_DATABASE=Microsoft Corp.
E: ID_PATH=acpi-VMBUS:01
E: ID_PATH_TAG=acpi-VMBUS_01
E: IFINDEX=2
E: INTERFACE=eth0
E: SUBSYSTEM=net
E: SYSTEMD_ALIAS=/sys/subsystem/net/devices/eth0
E: TAGS=:systemd:
E: USEC_INITIALIZED=135398
E: net.ifnames=0
```

```
[linvirt@CentOS-01 ~]$ ip link show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT
   qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP mo
de DEFAULT qlen 1000
   link/ether 00:0d:3a:3a:e2:7f brd ff:ff:ff:ff:ff:ff
[linvirt@CentOS-01 ~]$ ip link show dev eth0
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP mo
de DEFAULT qlen 1000
   link/ether 00:0d:3a:3a:e2:7f brd ff:ff:ff:ff:ff:ff
```



```
[linvirt@CentOS-01 ~]$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP qlen 1000
    link/ether 00:0d:3a:3a:e2:7f brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.4/24 brd 192.168.1.255 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::20d:3aff:fe3a:e27f/64 scope link
        valid_lft forever preferred_lft forever
[linvirt@CentOS-01 ~]$ ip addr show eth0
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP qlen 1000
    link/ether 00:0d:3a:3a:e2:7f brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.4/24 brd 192.168.1.255 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::20d:3aff:fe3a:e27f/64 scope link
        valid_lft forever preferred_lft forever
```

```
[linvirt@CentOS-01 ~]$ ip route show dev eth0
default via 192.168.1.1
168.63.129.16 via 192.168.1.1 proto static
169.254.0.0/16 scope link metric 1002
169.254.169.254 via 192.168.1.1 proto static
192.168.1.0/24 proto kernel scope link src 192.168.1.4
[linvirt@CentOS-01 ~]$ ip route show 0.0.0.0/0
default via 192.168.1.1 dev eth0
```

```
[linvirt@CentOS-01 ~]$ ip route get 9.9.9.9
9.9.9.9 via 192.168.1.1 dev eth0 src 192.168.1.4
    cache
```

---

```
linvirt@suse:/etc/sysconfig/network> sudo wicked show eth0
eth0
  link:      up
  type:      ethernet, hwaddr 00:0d:3a:2a:89:29
  config:    compat:suse:/etc/sysconfig/network/ifcfg-eth0
  leases:    ipv4 dhcp granted
  leases:    ipv6 dhcp requesting
  addr:      ipv4 10.1.0.4/24 [dhcp]
  route:     ipv4 default via 10.1.0.1 proto dhcp
  route:     ipv4 168.63.129.16/32 via 10.1.0.1 proto dhcp
  route:     ipv4 169.254.169.254/32 via 10.1.0.1 proto dhcp
```

```
[linvirt@CentOS-01 network-scripts]$ nmcli device show eth0
GENERAL.DEVICE:                eth0
GENERAL.TYPE:                   ethernet
GENERAL.HWADDR:                 00:0D:3A:3A:E2:7F
GENERAL.MTU:                    1500
GENERAL.STATE:                  10 (unmanaged)
GENERAL.CONNECTION:             --
GENERAL.CON-PATH:               --
WIRED-PROPERTIES.CARRIER:     on
IP4.ADDRESS[1]:                 192.168.1.4/24
IP4.GATEWAY:                    192.168.1.1
IP4.ROUTE[1]:                   dst = 168.63.129.16/32, nh = 192.168.1.1
, mt = 0
IP4.ROUTE[2]:                   dst = 169.254.0.0/16, nh = 0.0.0.0, mt =
1002
IP4.ROUTE[3]:                   dst = 169.254.169.254/32, nh = 192.168.1
.1, mt = 0
IP6.ADDRESS[1]:                 fe80::20d:3aff:fe3a:e27f/64
IP6.GATEWAY:
```

```
[linvirt@CentOS-01 ~]$ hostnamectl status
  Static hostname: CentOS-01
        Icon name: computer-vm
        Chassis: vm
        Machine ID: e8abe05b1d42472d882942fe2bdfc47e
        Boot ID: 3d2a68fc99a346349fa0656f5184cf0f
  Virtualization: microsoft
  Operating System: CentOS Linux 7 (Core)
        CPE OS Name: cpe:/o:centos:centos:7
        Kernel: Linux 3.10.0-514.26.2.el7.x86_64
  Architecture: x86-64
```

```
linvirt@ubuntu02:~$ sudo ls SCSI
[0:0:0:0] disk Msft Virtual Disk 1.0 /dev/sda
[1:0:1:0] disk Msft Virtual Disk 1.0 /dev/sdb
[5:0:0:0] cd/dvd Msft Virtual CD-ROM 1.0 /dev/sr0
```

```
linvirt@ubuntu02:~$ sudo lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda          8:0    0   30G  0 disk
├─sda1       8:1    0  29.9G  0 part /
├─sda14      8:14   0    4M    0 part
└─sda15      8:15   0  106M  0 part /boot/efi
sdb          8:16   0    4G    0 disk
└─sdb1       8:17   0    4G    0 part /mnt
sr0         11:0    1   628K  0 rom
```

---

```
linvirt@suse01:~> sudo btrfs subvolume list /srv/mydata
ID 258 gen 8 top level 5 path finance
linvirt@suse01:~> findmnt /home/finance
TARGET          SOURCE          FSTYPE OPTIONS
/home/finance  /dev/sdc[/finance] btrfs  rw,relatime,space_cache,subvolid=258,sub
```

```
[linvirt@centos ~]$ cat /proc/mdstat
Personalities : [raid0]
md127 : active raid0 sde[2] sdc[1] sdd[0]
        15716352 blocks super 1.2 512k chunks

unused devices: <none>
[linvirt@centos ~]$ sudo mdadm --detail /dev/md127
/dev/md127:
        Version : 1.2
  Creation Time : Wed Jun  6 15:24:36 2018
    Raid Level : raid0
    Array Size : 15716352 (14.99 GiB 16.09 GB)
   Raid Devices : 3
  Total Devices : 3
 Persistence : Superblock is persistent

   Update Time : Wed Jun  6 15:24:36 2018
     State : clean
   Active Devices : 3
 Working Devices : 3
  Failed Devices : 0
   Spare Devices : 0
```

---

```
linvirt@ubuntu01:~$ pstree -p | head -10
systemd(1)-+-accounts-daemon(1113)-+-{accounts-daemon}(1117)
    |                                     `--{accounts-daemon}(1128)
    |-agetty(1208)
    |-agetty(1215)
    |-atd(1165)
    |-cron(1166)
    |-dbus-daemon(1116)
    |-hv_kvp_daemon(1092)
    |-hv_vss_daemon(1144)
    |-iscsid(1106)
```

```
linvirt@ubuntu01:~$ systemctl status sshd.service
• ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
   Active: active (running) since Thu 2018-06-07 07:34:44 UTC; 58min ago
 Main PID: 1291 (sshd)
   Tasks: 1 (limit: 1051)
  CGroup: /system.slice/ssh.service
          └─1291 /usr/sbin/sshd -D

Jun 07 07:34:44 ubuntu01 systemd[1]: Starting OpenBSD Secure Shell server...
Jun 07 07:34:44 ubuntu01 sshd[1291]: Server listening on 0.0.0.0 port 22.
Jun 07 07:34:44 ubuntu01 sshd[1291]: Server listening on :: port 22.
```

---

## Chapter 6: Managing Linux Security and Identities

```
[root@server1 ~]# sestatus
SELinux status:                enabled
SELinuxfs mount:              /sys/fs/selinux
SELinux root directory:      /etc/selinux
Loaded policy name:          targeted
Current mode:                 enforcing
Mode from config file:       enforcing
Policy MLS status:           enabled
Policy deny_unknown status:  allowed
Max kernel policy version:   28
```

---

```
linvirt@ubuntu01:~$ sudo apparmor_status
apparmor module is loaded.
15 profiles are loaded.
15 profiles are in enforce mode.
  /sbin/dhclient
  /usr/bin/lxc-start
  /usr/bin/man
  /usr/lib/NetworkManager/nm-dhcp-client.action
  /usr/lib/NetworkManager/nm-dhcp-helper
  /usr/lib/connman/scripts/dhclient-script
  /usr/lib/snapd/snap-confine
  /usr/lib/snapd/snap-confine//mount-namespace-capture-helper
  /usr/sbin/tcpdump
lxc-container-default
lxc-container-default-cgns
lxc-container-default-with-mounting
lxc-container-default-with-nesting
man_filter
man_groff
0 profiles are in complain mode.
0 processes have profiles defined.
0 processes are in enforce mode.
0 processes are in complain mode.
0 processes are unconfined but have a profile defined.
```

---

```
Profile: /usr/sbin/nginx
Capability: dac_override
Severity: 9
```

```
1 - #include <abstractions/lxc/container-base>
2 - #include <abstractions/lxc/start-container>
[3 - capability dac_override,]
(A)llow / [(D)eny] / (I)gnore / Audi(t) / Abo(r)t / (F)inish
```

```
Profile: /usr/sbin/nginx
Path: /var/log/nginx/error.log
New Mode: w
Severity: 8
```

```
1 - #include <abstractions/lxc/container-base>
2 - #include <abstractions/lxc/start-container>
[3 - /var/log/nginx/error.log w,]
```

```
linvirt@ubuntu01:~$ echo test > ~/test
-bash: /home/linvirt/test: Read-only file system
linvirt@ubuntu01:~$ findmnt -T ~
TARGET SOURCE FSTYPE OPTIONS
/home /dev/sda1[/home] ext4 ro,relatime,discard,data=ordered
```



---

```
root@ubuntu01:~# systemd-run -p IPAccounting=yes ping -c5 9.9.9.9
Running as unit: run-rfd0ca0d359ee4f77aefa7b6e1fcfe43f.service
root@ubuntu01:~#
root@ubuntu01:~# systemctl show run-rfd0ca0d359ee4f77aefa7b6e1fcfe43f.service -p
  IPIngressBytes -p IPIngressPackets \
> -p IPEgressBytes -p IPEgressPackets
IPIngressBytes=18446744073709551615
IPIngressPackets=18446744073709551615
IPEgressBytes=18446744073709551615
IPEgressPackets=18446744073709551615
```

```
[linvirt@centos01 ~]$ timedatectl
    Local time: Tue 2018-07-17 14:51:20 UTC
    Universal time: Tue 2018-07-17 14:51:20 UTC
    RTC time: Tue 2018-07-17 14:51:20
    Time zone: Etc/UTC (UTC, +0000)
    NTP enabled: yes
NTP synchronized: yes
    RTC in local TZ: no
    DST active: n/a
```

```
[linvirt@centos01 ~]$ timedatectl
    Local time: Tue 2018-07-17 14:51:20 UTC
    Universal time: Tue 2018-07-17 14:51:20 UTC
    RTC time: Tue 2018-07-17 14:51:20
    Time zone: Etc/UTC (UTC, +0000)
    NTP enabled: yes
    NTP synchronized: yes
    RTC in local TZ: no
    DST active: n/a
```

```
[linvirt@centos01 ~]$ chronyc sources
210 Number of sources = 2
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^* 10.1.0.4                  2   6   17   57  -1846us[+1943us] +/-  49ms
^+ 10.1.0.5                  2   6   17   57  +1398us[+5186us] +/-  49ms
```

```
linvirt@ubuntu01:~$ sudo realm discover frederikvoslinvirt.onmicrosoft.com
frederikvoslinvirt.onmicrosoft.com
  type: kerberos
  realm-name: FREDERIKVOSLINVIRT.ONMICROSOFT.COM
  domain-name: frederikvoslinvirt.onmicrosoft.com
  configured: no
  server-software: active-directory
  client-software: sssd
  required-package: sssd-tools
  required-package: sssd
  required-package: libnss-sss
  required-package: libpam-sss
  required-package: adcli
  required-package: samba-common-bin
```

---

```
frederikvoslinvirt.onmicrosoft.com
  type: kerberos
  realm-name: FREDERIKVOSLINVIRT.ONMICROSOFT.COM
  domain-name: frederikvoslinvirt.onmicrosoft.com
  configured: kerberos-member
  server-software: active-directory
  client-software: sssd
  required-package: sssd-tools
  required-package: sssd
  required-package: libnss-sss
  required-package: libpam-sss
  required-package: adcli
  required-package: samba-common-bin
  login-formats: %U@frederikvoslinvirt.onmicrosoft.com
  login-policy: allow-realm-logins
```

---

# Chapter 7: Deploying Your Virtual Machines

---

## Create virtual machine



1

Basics  
Done



2

Size  
Done



3

Settings  
Done






4

Summary  
Ubuntu Server 18.04 LTS












# Template

 Download  Add to library  Deploy



Automate deploying resources with Azure Resource Manager templates in a single, coordinated way. [Learn more about template deployment.](#)

Template Parameters CLI PowerShell .NET Ruby

- ▶  Parameters (18)
- ▶  Variables (2)
- ▼  Resources (6)
  -  [parameters('virtualMachineName'...
  -  [parameters('diagnosticsStorageA...
  -  [parameters('virtualNetworkName'...
  -  [parameters('networkInterfaceNa...
  -  [parameters('publicIpAddressNam...
  -  [parameters('networkSecurityGrou...

```
1 {
2   "$schema":
3     "http://schema.management.azure.com/schemas/2015-08-19/management.azure.json",
4   "contentVersion": "1.0.0.0",
5   "parameters": {
6     "location": {
7       "type": "string"
8     },
9     "virtualMachineName": {
10      "type": "string"
11    },
12    "virtualMachineSize": {
13      "type": "string"
14    },
15    "adminUsername": {
```

The screenshot displays the Visual Studio Code interface with the Extensions Marketplace open. The search results list several extensions, with 'Azure Resource Manager Tools' by Microsoft selected. The extension's details page is shown, including its name, publisher (Microsoft), version (0.4.2), and a 'Preview' badge. The description states it provides language support for Azure Resource Manager deployment templates. A list of features is provided, such as JSON outline, IntelliSense, and signature help. The left sidebar shows the search results for 'azure', and the bottom status bar indicates the current file is 'Error for'.

EXTENSIONS: MARKETPLACE

Extension: Azure Resource Manager Tools x

### Azure Resource Manager Tools

Microsoft | 209,625 | ★★★★★ | Repository | License

Template language support for Azure Resource Manager JSON files.

Install

Details Contributions Changelog Dependencies

## Azure Resource Manager Tools for Visual Studio Code (Preview)

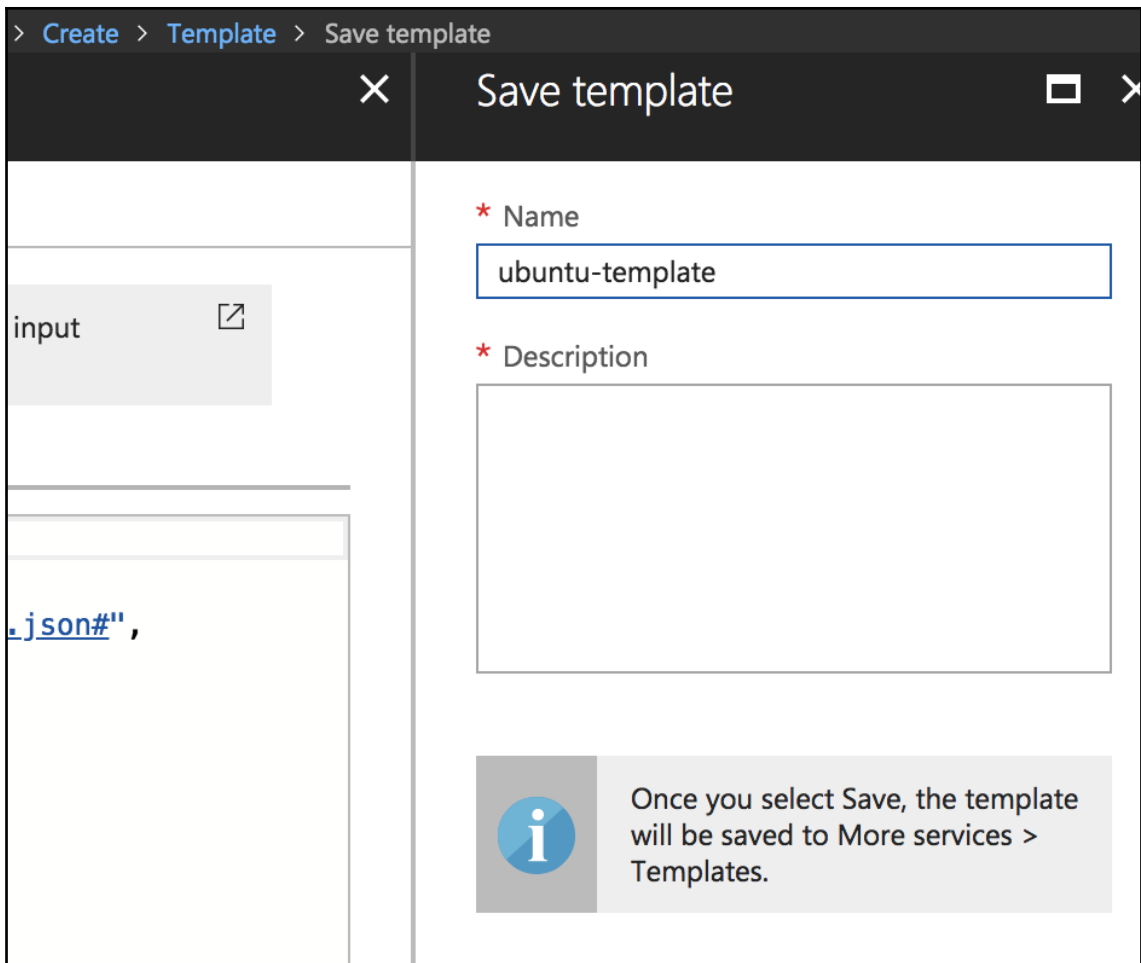
build passing | release v0.4.2

This extension provides language support for Azure Resource Manager deployment templates and template language expressions.

### Features

- JSON outline for easy navigation through large templates
- IntelliSense
  - Template Language Expression (TLE) function names
  - Parameter references
  - Variable references
  - resourceGroup() properties
  - subscription() properties
  - Properties of references to variables that are objects
- Signature help for TLE function parameters
- Go To Definition for variable and parameter references
- Peek for variable and parameter definitions
- Find all references (Shift + F12) for variables and parameters
- Rename all references (F2) for variables and parameters
- Hover for parameter description
- TLE brace matching
- Error for





```
student@azure01:~$ vagrant version
Installed Version: 2.1.2
Latest Version: 2.1.2

You're running an up-to-date version of Vagrant!
```

---

```
student@azure01:~/ubuntu_lts$ vagrant up
Bringing machine 'default' up with 'azure' provider...
=> default: Launching an instance with the following settings...
=> default: -- Management Endpoint: https://management.azure.com
=> default: -- Subscription Id: ████████████████████████████████████████
=> default: -- Resource Group Name: vagrant
=> default: -- Location: westus
=> default: -- Admin Username: vagrant
=> default: -- VM Name: linvirt001
=> default: -- VM Storage Account Type: Premium_LRS
=> default: -- VM Size: Standard_B1s
=> default: -- Image URN: Canonical:UbuntuServer:18.04-LTS:latest
=> default: -- DNS Label Prefix: linvirt001
=> default: -- Create or Update of Resource Group: vagrant
=> default: -- Starting deployment
=> default: -- Finished deploying
=> default: Waiting for SSH to become available...
Enter passphrase for /home/student/.ssh/id_rsa:
=> default: Machine is booted and ready for use!
```

```
Enter passphrase for key '/home/student/.ssh/id_rsa':
=> default: Running provisioner: shell...
default: Running: /tmp/vagrant-shell20180807-2269-1i5pqjq.sh
```

```
student@azure01:~$ packer version
Packer v1.2.5
```

```
=> azure-arm: Running builder ...
    azure-arm: Creating Azure Resource Manager (ARM) client ...
=> azure-arm: Creating resource group ...
=> azure-arm: -> ResourceGroupName : 'packer-Resource-Group-vhcm2t1rdf'
=> azure-arm: -> Location          : 'West Europe'
=> azure-arm: -> Tags              :
=> azure-arm: Validating deployment template ...
=> azure-arm: -> ResourceGroupName : 'packer-Resource-Group-vhcm2t1rdf'
=> azure-arm: -> DeploymentName    : 'pkrdpvhcm2t1rdf'
=> azure-arm: Deploying deployment template ...
=> azure-arm: -> ResourceGroupName : 'packer-Resource-Group-vhcm2t1rdf'
=> azure-arm: -> DeploymentName    : 'pkrdpvhcm2t1rdf'
=> azure-arm: Getting the VM's IP address ...
=> azure-arm: -> ResourceGroupName   : 'packer-Resource-Group-vhcm2t1rdf'
=> azure-arm: -> PublicIPAddressName  : 'pkripvhcm2t1rdf'
=> azure-arm: -> NicName             : 'pkrnivhcm2t1rdf'
=> azure-arm: -> Network Connection  : 'PublicEndpoint'
=> azure-arm: -> IP Address         : '40.114.202.106'
=> azure-arm: Waiting for SSH to become available...
=> azure-arm: Connected to SSH!
=> azure-arm: Provisioning with shell script: /tmp/packer-shell1859779849
=> azure-arm: Querying the machine's properties ...
=> azure-arm: -> ResourceGroupName : 'packer-Resource-Group-vhcm2t1rdf'
=> azure-arm: -> ComputeName       : 'pkrvmvhcm2t1rdf'
=> azure-arm: -> Managed OS Disk   : '/subscriptions/88525bff-081c-45ad-bc
2t1rdf/providers/Microsoft.Compute/disks/pkrosvhcm2t1rdf'
=> azure-arm: Querying the machine's additional disks properties ...
=> azure-arm: -> ResourceGroupName : 'packer-Resource-Group-vhcm2t1rdf'
=> azure-arm: -> ComputeName       : 'pkrvmvhcm2t1rdf'
```

```
==> Builds finished. The artifacts of successful builds are:
--> azure-arm: Azure.ResourceManagement.VMImage:
```

```
ManagedImageResourceGroupName: LinuxOnAzure
ManagedImageName: myPackerImage
ManagedImageLocation: westeurope
```

---

```
linvirt@ubuntulevel:~$ sudo waagent -deprovision+user
WARNING! The waagent service will be stopped.
WARNING! Cached DHCP leases will be deleted.
WARNING! root password will be disabled. You will not be able to login as root.
WARNING! /etc/resolvconf/resolv.conf.d/tail and /etc/resolvconf/resolv.conf.d/original will be deleted.
WARNING! linvirt account and entire home directory will be deleted.
Do you want to proceed (y/n)y
```

```
student@azure01:/etc/grub.d$ az image list --output table
```

Location	Name	ProvisioningState	ResourceGroup
westus	customUbuntu	Succeeded	CAPTURE

---

## Chapter 8: Exploring Continuous Configuration Automation

```
ok: [Ubuntu02] => {
  "users_created": {
    "changed": true,
    "msg": "All items completed",
    "results": [
      {
        "_ansible_ignore_errors": null,
        "_ansible_item_label": {
          "name": "testuser1"
        },
        "_ansible_item_result": true,
        "_ansible_no_log": false,
        "_ansible_parsed": true,
        "changed": true,
        "comment": "",
        "create_home": true,
        "failed": false,
        "group": 1002,
        "home": "/home/testuser1",
```



Ubuntu01  
Virtual machine

Search (Ctrl+*/*)

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems

SETTINGS

- Networking
- Disks

Connect Start Restart

'Ubuntu01' is not using Managed Disks.

Resource group [\(change\)](#)  
MYLOALAB

Status  
Running

Location  
West Europe

Subscription [\(change\)](#)  
Pay-As-You-Go

Subscription ID  
88525bff-081c-45ad-ba31-4e79cd539e69

Tags [\(change\)](#)  
webservers :

```
[ERROR ] The Salt Master has cached the public key for this node, this salt mi  
nion will wait for 10 seconds before attempting to re-authenticate  
Minion failed to authenticate with the master, has the minion key been accepted?
```

---

```
local:
-----
      ID: states
Function: no.None
      Result: False
Comment: No Top file or master_tops data matches found.
Changes:

Summary for local
-----
Succeeded: 0
Failed:    1
-----
Total states run:    1
Total run time:    0.000 ms
```

```
Passed invalid arguments to ip.get_interface: get_interface() takes exactly
1 argument (0 given)
```

```
Return the contents of an interface script
```

```
CLI Example:
```

```
.. code-block:: bash
```

```
    salt '*' ip.get_interface eth0
```



Home > Subscriptions > Pay-As-You-Go - Management certificates

## Pay-As-You-Go - Management certificates

Subscription

Search (Ctrl+/) <<

Upload Delete Refresh

Automate resource management using service principals with R

Search certificates

<input type="checkbox"/>	NAME	STATUS
	Pay-As-You-Go...	✓ Created
	Pay-As-You-Go...	✓ Created
	Pay-As-You-Go...	✓ Created
	Pay-As-You-Go...	✓ Created
	E=info@linvirt.n...	✓ Created
	Pay-As-You-Go...	✓ Created
	DC=dcs-trial_M...	✓ Created

Payment methods

Partner information

SETTINGS

Programmatic deployment

Resource groups


Resources

Usage + quotas


Policies

Management certificates


My permissions

 Overview


---

 Activity log


---

 Access control (IAM)

---

 Tags


---

 Diagnose and solve problems


---

CONFIGURATION MANAGEMENT


---

 Inventory


---

 Change tracking


---

 DSC nodes


---

 DSC configurations

---

 DSC configurations gallery (Pre...)

---

 DSC node configurations

Resource group [\(change\)](#)  
**MyLab1**

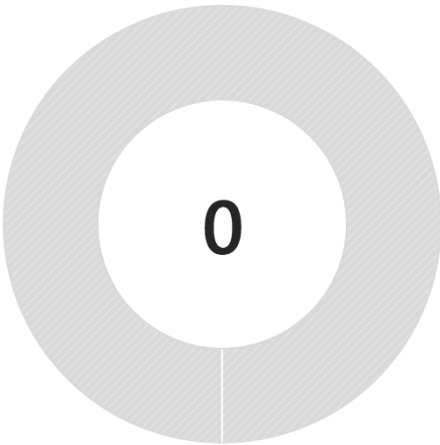
Subscription ID  
88525bff-081c-45ad-ba31-4e79c...

Location  
West Europe

Status  
Active

---

**Job Statistics**  
LAST 7 DAYS



**0**

	FAILED	0
	SUSPENDED	0
	COMPLETED	0
	RUNNING	0
	QUEUED	0
	STOPPED	0

---

```
[root@centos01 bin]# /opt/omi/bin/omicli id
instance of OMI_Identify
{
  [Key] InstanceID=2FDB5542-5896-45D5-9BE9-DC04430AAABE
  SystemName=centos01
  ProductName=OMI
  ProductVendor=Microsoft
  ProductVersionMajor=1
  ProductVersionMinor=4
  ProductVersionRevision=2
  ProductVersionString=1.4.2-3
  Platform=LINUX_X86_64_GNU
  OperatingSystem=LINUX
  Architecture=X86_64
  Compiler=GNU
  ConfigPrefix=GNU
  ConfigLibDir=/opt/omi/lib
  ConfigBinDir=/opt/omi/bin
  ConfigIncludeDir=/opt/omi/include
  ConfigDataDir=/opt/omi/share
  ConfigLocalStateDir=/var/opt/omi
  ConfigSysConfDir=/etc/opt/omi/conf
  ConfigProviderDir=/etc/opt/omi/conf
  ConfigLogFile=/var/opt/omi/log/omiserver.log
  ConfigPIDFile=/var/opt/omi/run/omiserver.pid
  ConfigRegisterDir=/etc/opt/omi/conf/omiregister
  ConfigSchemaDir=/opt/omi/share/omischema
  ConfigNameSpaces={root-omi, root-Microsoft-DesiredStateConfiguration, root-Microsoft-Windows-DesiredStateConfiguration}
```

---

## Chapter 9: Container Virtualization in Azure

```
[root@centos01 ~]# hostnamectl
  Static hostname: n/a
Transient hostname: centos01
      Icon name: computer-container
      Chassis: container
      Machine ID: 75a8d3f58d9b47ce9e15f3f8e6aeca4
      Boot ID: e7374a2812ab4a64920accabb3753f7f
Virtualization: systemd-nspawn
Operating System: CentOS Linux 7 (Core)
      CPE OS Name: cpe:/o:centos:centos:7
      Kernel: Linux 3.10.0-862.3.3.el7.x86_64
Architecture: x86_64
```

```
linvirt@rkt01 ~ $ rkt version
rkt Version: 1.30.0
appc Version: 0.8.11
Go Version: go1.9.6
Go OS/Arch: linux/amd64
Features: -TPM +SDJOURNAL
```

---

```
linvirt@rkt01 ~ $ sudo rkt list
```

UUID	APP	IMAGE NAME	STATE
98db8f3d	alpine-sh	quay.io/coreos/alpine-sh:latest	exited

```
linvirt@rkt01 ~ $ sudo rkt status 98db8f3d
```

```
state=exited
```

```
created=2018-07-28 10:39:37 +0000 UTC
```

```
started=2018-07-28 10:39:37 +0000 UTC
```

```
networks=default:ip4=172.16.28.2
```

```
pid=1394
```

```
exited=true
```

```
linvirt@rkt01 ~ $ sudo rkt image list
```

ID	NAME
sha512-6426eb927234	coreos.com/rkt/stage1-coreos:1.30.0
sha512-2222d0a86708	quay.io/coreos/alpine-sh:latest

```
rkt01 linvirt # rkt status $(rkt list | awk '/apache2/ {print $1}')
```

```
state=running
```

```
created=2018-07-29 12:05:07 +0000 UTC
```

```
started=2018-07-29 12:05:07 +0000 UTC
```

```
networks=default:ip4=172.16.28.2
```

```
pid=5084
```

```
exited=false
```

---

```
[root@fedora01 linvirt]# buildah images
IMAGE ID          IMAGE NAME
735f80812f90     docker.io/library/ubuntu:latest
8be34820f18d     localhost/test/apache2:latest
```

```
frederik@Ubuntu01:~$ docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
9db2ca6ccae0: Pull complete
Digest: sha256:4b8ff392a12ed9ea17784bd3c9a8b1fa3299cac44aca35a85c90c5e3c7afacdc
Status: Downloaded newer image for hello-world:latest
```

Hello from Docker!  
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:

1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.  
(amd64)
3. The Docker daemon created a new container from that image which runs the executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it to your terminal.

To try something more ambitious, you can run an Ubuntu container with:  
\$ docker run -it ubuntu bash

```
frederik@Ubuntu01:~$ docker image ls
REPOSITORY          TAG          IMAGE ID          CREATED
SIZE
hello-world        latest      2cb0d9787c4d     12 days ago
1.85kB
-
```

---

```
Successfully built 059e5c8a6315
Successfully tagged apache_image:latest
```

```
root@UbuntuDocker:~/my-app# docker history 059e5c8a6315
IMAGE          CREATED          CREATED BY
059e5c8a6315   6 minutes ago   /bin/sh -c #(nop) EXPOSE 80
aed0499b4b1c   6 minutes ago   /bin/sh -c #(nop) CMD ["/usr/sbin/apachectl...
ea4250e29eb1   6 minutes ago   /bin/sh -c apt-get --yes install apache2
7662e8ae8d6d   8 minutes ago   /bin/sh -c apt-get --yes update
af1570b472a2   21 minutes ago
```

```
"Gateway": "172.17.0.1",
"GlobalIPv6Address": "",
"GlobalIPv6PrefixLen": 0,
"IPAddress": "172.17.0.2",
"IPPrefixLen": 16,
"IPv6Gateway": "",
"MacAddress": "02:42:ac:11:00:02",
"Networks": {
```

---

```
Kernel Version: 4.13.0-1018-azure
Operating System: Ubuntu 16.04.4 LTS
OSType: linux
Architecture: x86_64
CPUs: 2
Total Memory: 6.785GiB
Name: ubuntu02
ID: DB54:7BWP:WJER:RZVI:3PHM:7A4N:NA0J:X
Docker Root Dir: /var/lib/docker
Debug Mode (client): false
Debug Mode (server): false
Registry: https://index.docker.io/v1/
Labels:
  provider=azure
Experimental: false
Insecure Registries:
  127.0.0.0/8
Live Restore Enabled: false
```



```
frederik@UbuntuDocker:~$ docker-machine ls
```

NAME	ACTIVE	DRIVER	STATE	URL
ubuntu02	*	azure_	Running	tcp://104.42.45.213:2376

```
frederik@UbuntuDocker:~$ docker-compose version
docker-compose version 1.22.0, build f46880fe
docker-py version: 3.4.1
CPython version: 3.6.6
OpenSSL version: OpenSSL 1.1.0f 25 May 2017
```

The screenshot shows the 'Create Container Instances' wizard in the Azure portal. The 'Basics' step is selected, and the following configuration is visible:

- Container name:** nginx
- Container image type:** Public
- Container image:** (Empty field)
- Subscription:** Pay-As-You-Go
- Resource group:** Create new
- Location:** West Europe

The left pane shows a list of container instances with a filter box and a 'Create container instances' button. The middle pane shows the progress of the wizard steps: 1. Basics, 2. Configuration, and 3. Summary.

> Configuration

### Create Container Instances

1 Basics Done ✓

2 Configuration Specify container requirements >

3 Summary Container Instances >

---

### Configuration

OS Type  
 Windows  Linux

Number of cores  
1

\* Memory (GB)  
1.5

### Networking

Public IP address  
 Yes  No

DNS name label ⓘ

\* Port ⓘ  
80

Open additional ports  
 Yes  No

Port protocol ⓘ  
TCP

### Advanced

Restart policy ⓘ  
Always

```
"ipAddress": {
  "additionalProperties": {},
  "dnsNameLabel": "nginx-loa",
  "fqdn": "nginx-loa.westus.azurecontainer.io",
  "ip": "40.112.132.135",
  "ports": [
    {
      "additionalProperties": {},
      "port": 80,
      "protocol": "TCP"
    }
  ]
},
```

```
frederik@UbuntuDocker:~/build$ docker search --filter "is-official=true" nginx --no-trunc
```


NAME	DESCRIPTION	STARS
nginx	Official build of Nginx.	9130
kong	Open-source_Microservice & API Management layer built on top of NGINX.	209

Home > Container registries > Create container registry

## Container registries


frederikvoslinvirt (Default Directory)

+ Add   Edit columns   More

 [Help us improve Azure Container Registry.](#)

Filter by name...

**NAME** ↑↓



\* Registry name  
linvirt ✓  
.azurecr.io

\* Subscription  
Pay-As-You-Go

\* Resource group  
 Create new    Use existing  
Docker\_LOA

\* Location  
West US

\* Admin user ⓘ  
Enable   Disable

\* SKU ⓘ  
Standard

Home > linvirt - Access keys

# linvirt - Access keys

Container registry

Search (Ctrl+/) <<

- Tags
- Quick start
- Events

SETTINGS

- Access keys

Registry name

linvirt

Login server

linvirt.azurecr.io

Admin user ⓘ

Enable Disable

---

## Chapter 10: Working with Azure Kubernetes Service

```
"location": "westus",
"name": "Cluster01",
"networkProfile": {
  "dnsServiceIp": "10.0.0.10",
  "dockerBridgeCidr": "172.17.0.1/16",
  "networkPlugin": "kubenet",
  "networkPolicy": null,
  "podCidr": "10.244.0.0/16",
  "serviceCidr": "10.0.0.0/16"
},
"nodeResourceGroup": "MC_MyKubernetes_Cluster01_westus",
```

The screenshot shows the Kubernetes dashboard interface. On the left is a sidebar with navigation options: Cluster, Namespaces, Nodes, Persistent Volumes, Roles, Storage Classes, Namespace (default), Overview (highlighted), Workloads (Daemon Sets, Deployments, Jobs), and a search bar. The main area is titled 'Overview' and contains two sections:

**Services**

Name	Labels	Cluster IP	Internal endpoints	External endpoints
✓ kubernetes	compon... provider...	10.0.0.1	kubernetes... kubernetes...	-

**Secrets**

Name	Age
default-token-1fs0l	30 minutes

```
frederik in ~ at ubuntu via • v8.10.0 at 🌀 minikube took 7m 58s
→ az aks get-credentials --resource-group MyKubernetes --name Cluster01
Merged "Cluster01" as current context in /home/frederik/.kube/config
```

```
frederik in ~ at ubuntu via • v8.10.0 at 🌀 Cluster01 took 4s
```

```
→ kubectl config get-contexts
CURRENT  NAME          CLUSTER    AUTHINFO
*        Cluster01    Cluster01  clusterUser_MyKubernetes_Cluster01
         minikube     minikube   minikube
```

```
→ kubectl cluster-info
```

```
Kubernetes master is running at https://cluster01-mykubernetes-88525b-08335046.hcp.westus2.azure.com/cluster01-mykubernetes-88525b-08335046.hcp.westus2.azure.com:443
```

```
Heapster is running at https://cluster01-mykubernetes-88525b-08335046.hcp.westus2.azure.com/cluster01-mykubernetes-88525b-08335046.hcp.westus2.azure.com:443/api/v1/namespaces/kube-system/services/heapster/proxy
```

```
KubeDNS is running at https://cluster01-mykubernetes-88525b-08335046.hcp.westus2.azure.com/cluster01-mykubernetes-88525b-08335046.hcp.westus2.azure.com:443/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy
```

```
kubernetes-dashboard is running at https://cluster01-mykubernetes-88525b-08335046.hcp.westus2.azure.com/cluster01-mykubernetes-88525b-08335046.hcp.westus2.azure.com:443/api/v1/namespaces/kube-system/services/kubernetes-dashboard/proxy
```

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.

```
→ kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
aks-nodepool1-18722659-1	Ready	agent	7m	v1.8.14

```
→ kubectl get deployment
```

NAME	DESIRED	CURRENT	UP-TO-DATE	AVAILABLE	AGE
nginx	1	1	1	1	35m

```
→ kubectl get pods
```

NAME	READY	STATUS	RESTARTS	AGE
nginx-1423793266-7tncg	1/1	Running	0	13m

```
→ kubectl get services
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
kubernetes	ClusterIP	10.0.0.1	<none>	443/TCP	1h

```
→ kubectl get service
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)
kubernetes	ClusterIP	10.0.0.1	<none>	443/TCP
nginx-7c87f569d-vbh7q	LoadBalancer	10.0.135.39	40.118.186.145	80:32161/TCP



```
→ helm version
```

```
Client: &version.Version{SemVer:"v2.9.1", GitCommit:"20adb27c7c586846  
64e7390ebe710", GitTreeState:"clean"}  
Server: &version.Version{SemVer:"v2.9.1", GitCommit:"20adb27c7c586846  
64e7390ebe710", GitTreeState:"clean"}
```

```
→ helm repo list
```

```
NAME      URL  
stable    https://kubernetes-charts.storage.googleapis.com  
local     http://127.0.0.1:8879/charts  
azure     https://kubernetescharts.blob.core.windows.net/azure
```

```
→ helm search wordpress
```

NAME	CHART VERSION	APP VERSION	DESCRIPTION
azure/wordpress	0.10.0	4.9.4	Web publishi
stable/wordpress	2.1.4	4.9.7	Web publishi

```
→ helm ls
```

NAME	REVISION	UPDATED	STATUS
coy-aardwolf	1	Wed Aug 1 00:37:48 2018	DEPLOYED

```
→ kubectl get deployment
```

NAME	DESIRED	CURRENT	UP-TO-DATE	AVAILABLE	AGE
coy-aardwolf-wordpress	1	1	1	1	35m

```
→ kubectl get service
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
coy-aardwolf-mariadb	ClusterIP	10.0.16.176	<none>	3306/TCP	5m
coy-aardwolf-wordpress	LoadBalancer	10.0.239.129	104.42.183.133	80:30608/TCP, 443:31070/TCP	5m
kubernetes	ClusterIP	10.0.0.1	<none>	443/TCP	3h

```
## Bitnami WordPress image version
## ref: https://hub.docker.com/r/bitnami/wordpress/tags/
##
image:
  registry: docker.io
  repository: bitnami/wordpress
  tag: 4.9.7-debian-9
  ## Specify a imagePullPolicy
  ## Defaults to 'Always' if image tag is 'latest', else set to 'I
  ## ref: http://kubernetes.io/docs/user-guide/images/#pre-pulling
  ##
  pullPolicy: IfNotPresent
  ## Optionally specify an array of imagePullSecrets.
  ## Secrets must be manually created in the namespace.
  ## ref: https://kubernetes.io/docs/tasks/configure-pod-container
  ##
  # pullSecrets:
  #   - myRegistrKeySecretName

## User of the application
## ref: https://github.com/bitnami/bitnami-docker-wordpress#enviro
##
wordpressUsername: user
```

→ draft version

```
&version.Version{SemVer:"v0.15.0", GitCommit:"9d73889a1318
```

◆ → draft create

```
--> Draft detected JavaScript (100.000000%)
```

```
--> Ready to sail
```

◆ → draft up

Draft Up Started: 'mynode': 01CKTRRQJS57FV02WPAPJFK24A

mynode: Building Docker Image: SUCCESS ⚓ (1.0008s)

mynode: Pushing Docker Image: SUCCESS ⚓ (275.2875s)

mynode: Releasing Application: SUCCESS ⚓ (6.5091s)

Inspect the logs with `draft logs 01CKTRRQJS57FV02WPAPJFK24A`

NAME	REVISION	UPDATED	STATUS	CHART
mynode	1	Wed Aug 1 05:10:27 2018	DEPLOYED	javascript-v0.1.0

◆ → kubectl get services

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)
kubernetes	ClusterIP	10.0.0.1	<none>	443/TCP
mynode-javascript	ClusterIP	10.0.156.106	<none>	8080/TCP

◆ → kubectl get pod

NAME	READY	STATUS
mynode-javascript-576bcfffb-c-sd5dv	0/1	Error

→ draft connect

Connect to javascript:8080 on localhost:39053

[javascript]:

[javascript]: > mynode@0.0.2 start /usr/src/app

[javascript]: > node mynode.js

[javascript]:



---

```
→ kubectl get deployment
```

```
NAME          DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
nginx         1         1         1             1           19m
```

```
spec:
```

```
containers:
```

```
- image: nginx:1.15.2
```

```
→ kubectl describe deployment/nginx
```

```
Name:          nginx
Namespace:     default
CreationTime:  Thu, 02 Aug 2018 08:40:53 +0200
Labels:        run=nginx
Annotations:   deployment.kubernetes.io/revision=2
               kubernetes.io/change-cause=kubectl edit deployment/nginx

--record=true
Selector:      run=nginx
Replicas:      1 desired | 1 updated | 1 total | 1 available | 0 unavail
lable
StrategyType:  RollingUpdate
MinReadySeconds: 0
RollingUpdateStrategy: 25% max unavailable, 25% max surge
Pod Template:
  Labels:  run=nginx
  Containers:
    nginx:
      Image:  nginx:1.15.2
```

```
→ kubectl get deployment
```

```
NAME          DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
nginx         1         1         1             1           19m
```

```
→ kubectl get pods -o wide
```

NAME	READY	STATUS	RESTARTS	AGE	IP
nginx-59f57bcfc8-kjzhh	1/1	Running	0	2m	10.244.0.11
aks-nodepool1-18722659-0					
nginx-59f57bcfc8-kslkr	1/1	Running	0	34m	10.244.0.9
aks-nodepool1-18722659-0					
nginx-59f57bcfc8-rknh5	1/1	Running	0	2m	10.244.0.10
aks-nodepool1-18722659-0					

```
→ az aks list --query "[?].kubernetesVersion"
[
  "1.9.9"
]
```

```
→ az aks get-versions --location westus --output table | egrep "^1.9.9"
1.9.9          1.10.3, 1.10.5, 1.10.6
```

```
→ kubectl get sc
```

NAME	PROVISIONER	AGE
default (default)	kubernetes.io/azure-disk	6h
managed-premium	kubernetes.io/azure-disk	6h
storageforapp	kubernetes.io/azure-disk	4m

---

```
→ kubectl get sc
```

```
NAME                PROVISIONER          AGE
azurefile           kubernetes.io/azure-file 5s
default (default)   kubernetes.io/azure-disk 6h
managed-premium     kubernetes.io/azure-disk 6h
storageforapp      kubernetes.io/azure-disk 13m
```

---

# Chapter 11: Troubleshooting and Monitoring Your Workloads

Run Command uses the VM agent to let you run a script inside this virtual machine. This can be helpful for troubleshooting and recovery, and for general machine and application maintenance. Select a command below to see details.

NAME	DESCRIPTION
RunShellScript	Executes a Linux shell script
ifconfig	List network configuration

---

---

## SUPPORT + TROUBLESHOOTING

---



Resource health

---



Boot diagnostics

---



Reset password

---



Redeploy

---



Serial console (Preview)

---



New support request

---



---

 Update    Discard

This uses the VMAccessForLinux extension to reset the [more](#)

Mode 

- Reset password
- Reset SSH public key
- Reset configuration only

\* Username 

linvirt


\* Password




.....

\* Confirm password




.....

Home > centos01 - Serial console (Preview)

 centos01 - Serial console (Preview)  
Virtual machine

Search (Ctrl+/) << ? Feedback   

[linvirt@centos01 ~]\$

-  Inventory
-  Change tracking
-  Run command

```
[linvirt@centos01 ~]$ ss -tulpn
```

Netid	State	Recv-Q	Send-Q	Local Address:Port	Peer Address:Port
udp	UNCONN	0	0	*:56610	*:*
udp	UNCONN	0	0	127.0.0.1:323	*:*
udp	UNCONN	0	0	*:68	*:*
udp	UNCONN	0	0	*:111	*:*
udp	UNCONN	0	0	*:680	*:*
udp	UNCONN	0	0	:::1:323	:::*
udp	UNCONN	0	0	:::111	:::*
udp	UNCONN	0	0	:::680	:::*
tcp	LISTEN	0	50	*:3306	*:*
tcp	LISTEN	0	10	127.0.0.1:29131	*:*
tcp	LISTEN	0	128	*:111	*:*
tcp	LISTEN	0	128	*:22	*:*
tcp	LISTEN	0	100	127.0.0.1:25	*:*
tcp	LISTEN	0	128	:::111	:::*
tcp	LISTEN	0	128	:::80	:::*
tcp	LISTEN	0	128	:::22	:::*
tcp	LISTEN	0	100	:::1:25	:::*

```
[linvirt@centos01 ~]$ sudo iptables-save
# Generated by iptables-save v1.4.21 on Mon Aug 6 05:04:46 2018
*security
:INPUT ACCEPT [25620:47224378]
:FORWARD ACCEPT [0:0]
:OUTPUT ACCEPT [25059:6565020]
-A OUTPUT -d 168.63.129.16/32 -p tcp -m owner --uid-owner 0 -j ACCEPT
-A OUTPUT -d 168.63.129.16/32 -p tcp -m conntrack --ctstate INVALID,NEW -j DROP
COMMIT
# Completed on Mon Aug 6 05:04:46 2018
```

## Get started with Log Analytics

Log Analytics collects data from a variety of sources and uses a powerful query language to give you insights into the operation of your applications and resources. Use Azure Monitor to access the complete set of tools for monitoring all of your Azure resources

1

### Connect a data source

Select one or more data sources to connect to the workspace

- [Azure virtual machines \(VMs\)](#)
- [Windows, Linux and other sources](#)
- [Azure Activity logs](#)

Learn more





- [Transitioning from OMS Portal - FAQ's](#)
- [Documentation site](#)
- [Community](#)

2

### Configure monitoring solutions

Add monitoring solutions that provide insights for applications and services in your environment

[View solutions](#)

NAME	OMS CONNECTION	OS
 centos01	 This workspace	Linux
 centos02	 Not connected	Linux

---

## Get started with Log Analytics

Log Analytics collects data from a variety of sources and uses a powerful query language to give you insights into the operation of your applications and resources. Use Azure Monitor to access the complete set of tools for monitoring all of your Azure resources

### 1 Connect a data source

Select one or more data sources to connect to the workspace

[Azure virtual machines \(VMs\)](#)

[Windows, Linux and other sources](#)

[Azure Activity logs](#)

### Learn more

[Transitioning from OMS Portal - FAQ's](#)

[Documentation site](#)




[Community](#)

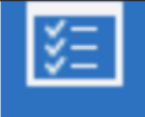




### 2 Configure monitoring solutions

Add monitoring solutions that provide insights for applications and services in your environment

[View solutions](#)

---

Management Solutions   

	Health Check (Preview) Microsoft
	SQL Health Check Microsoft
	Security and Audit Microsoft
	Service Fabric Analytics Microsoft
	Service Map Microsoft



## GENERAL

Quick Start

Workspace summary

View Designer

Log Search

Solutions

## NAME

NetworkMonitoring(OMSLoA)

ServiceMap(OMSLoA)


WireData2(OMSLoA)

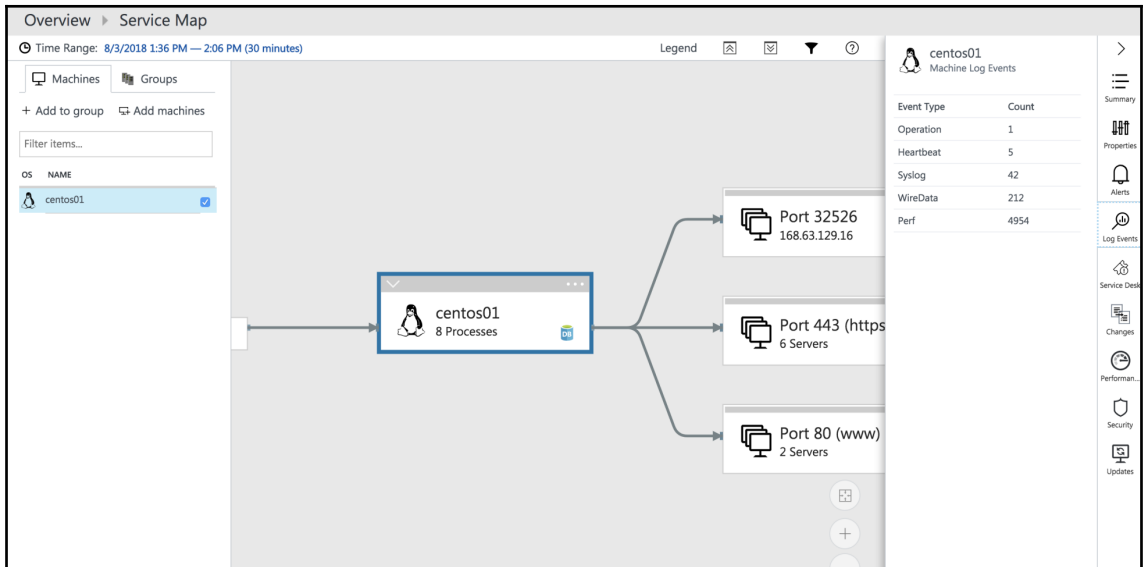
# Summary

## Service Map

**1**  
Machines reporting  
(Last 30 min)

**1**  
All-time machines reporting

0  1 



Home > Network Watcher - Traffic Analytics

## Network Watcher - Traffic Analytics

Microsoft

Search (Ctrl+J) Refresh Send us your feedback FAQ

Overview

**MONITORING**

- Topology
- Connection monitor

**NETWORK DIAGNOSTIC TOOLS**

- IP flow verify
- Next hop
- Security group view
- VPN Diagnostics
- Packet capture
- Connection troubleshoot

**METRICS**

- Usage + quotas

**LOGS**

- NSG flow logs
- Diagnostic logs
- Traffic Analytics**

### TRAFFIC VISUALIZATION

View your network traffic flow distribution

Total flows

**68.7K**

Direction	Allowed	Blocked	Benign	Malicious
Inbound	8.4K	18K	8K	418
Outbound	56K	56K	18K	73

This tabular representation of network traffic flow distribution is "not to scale"

Do more

- Launch Log Search query
- Documentation

### YOUR ENVIRONMENT

Across Azure regions, virtual networks, resources and subnetworks

**Deployed Azure regions**

**1** of 42 total

Active	1
Inactive	0
Traffic Analytics enabled	1
Allowed malicious	1

[View map](#)

**Enabled NSGs\***

**8** of 9

[\\*Enable all NSGs to view richer data](#)

**Talking to Internet**

Ports receiving traffic from Internet **4**

Hosts sending traffic to Internet **4**

**Virtual networks**

**4** total

Active	2
Inactive	2
Allowed malicious	2

[View VNets](#)

**Virtual subnetworks**

**12** total

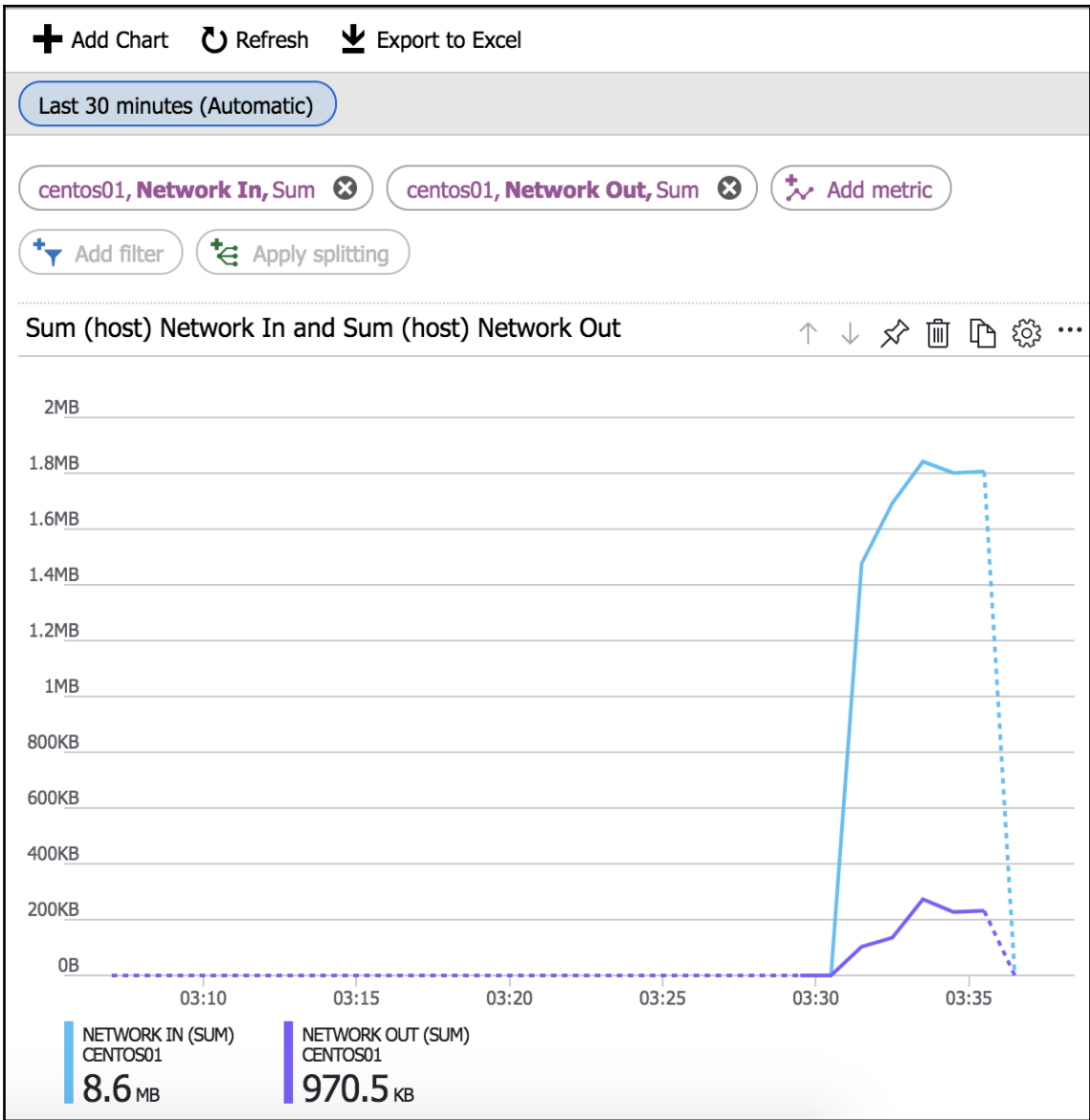
Active	3
Inactive	9
Allowed malicious	2

[View subnets](#)

**External connections**

On premise	1
Azure regions	2
Public IPs	2





```

top - 13:54:12 up 26 min, 2 users, load average: 0.00, 0.15, 0.45
Tasks: 123 total, 1 running, 122 sleeping, 0 stopped, 0 zombie
%Cpu(s): 2.0 us, 0.3 sy, 0.0 ni, 97.7 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
KiB Mem : 931964 total, 281300 free, 209140 used, 441524 buff/cache
KiB Swap: 0 total, 0 free, 0 used. 513504 avail Mem
  
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
3061	root	20	0	396264	26968	5644	S	3.0	2.9	0:46.28	python
1	root	20	0	128016	6236	3724	S	0.0	0.7	0:08.43	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthreadd
3	root	20	0	0	0	0	S	0.0	0.0	0:00.30	ksoftirqd/0
5	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kworker/0:+
6	root	20	0	0	0	0	S	0.0	0.0	0:00.67	kworker/u2+
7	root	rt	0	0	0	0	S	0.0	0.0	0:00.00	migration/0
8	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_bh

```

mon-16g [H for help] Hostname=centos01 Refresh= 2secs 14:32.19
CPU Utilisation Stats
ALL 3.5 0.0 0.0 96.0 0.0 0.0 0.0 0.0 0.0 0.0
CPU User% Nice% Sys% Idle% Wait% HWirq% SWirq% Steal% Guest% GuestNice%
1 3.5 0.0 0.0 96.0 0.0 0.0 0.0 0.0 0.0 0.0
Memory and Swap
PageSize:4KB RAM-Memory Swap-Space High-Memory Low-Memory
Total (MB) 910.1 0.0 - not in use - not in use
Free (MB) 154.5 0.0
Free Percent 17.0% 0.0%
Linux Kernel Internal Memory (MB)
Cached= 455.5 Active= 404.0
Buffers= 2.0 Swpcached= 0.0 Inactive = 179.9
Dirty = 0.0 Writeback = 0.0 Mapped = 24.7
Slab = 94.9 Commit_AS = 730.4 PageTables= 7.3
Virtual Memory
nr_dirty = 9 pgpgin = 0 High Normal DMA
nr_writeback= 0 pgpgout = 60 alloc 0 0 0
nr_unstable = 0 pgpswpin = 0 refill 0 0 0
nr_table_pgs= 1876 pgpswpout = 0 steal 0 0 0
nr_mapped = 6325 pgfree = 75 scan_kswapd 0 0 0
nr_slab = -1 pgactivate = 0 scan_direct 0 0 0
pgdeactivate= 0
allocstall = 0 pgfault = 1416 kswapd_steal = 0

```

```

centos01 (CentOS Linux 7.5.1804 64bit / Linux 3.10.0-862.3.3.el7.x86_64)      Uptime: 15:16:36

CPU [ 8.0%]   CPU      8.0%      MEM      60.9%      SWAP      0.0%      LOAD      1-core
MEM [ 60.9%] user:    5.2%      total:   910M      total:    0      1 min:   0.07
SWAP [ 0.0%] system:  2.3%      used:    555M      used:    0      5 min:   0.06
idle:    92.6%  free:    356M      free:    0      15 min:  0.05

NETWORK      Rx/s   Tx/s   TASKS 124 (215 thr), 2 run, 122 slp, 0 oth sorted automatically
eth0         442Kb  215Kb
lo           0b     0b

DISK I/O     R/s    W/s
fd0          0      0
sda1         0      0
sda2         0     21K
sdb1         0      0

FILE SYS     Used   Total
/ (sda2)    4.38G 29.5G
/boot       105M  497M
_resource  16.0M 3.87G

          CPU% MEM%  PID USER      NI S Command
          3.8  1.6 2795 linvirt   0 R /usr/bin/python /usr/bin/glances
          2.6  2.7 3061 root     0 S python -u bin/WALinuxAgent-2.2.30
          0.3  0.2  510 root     0 S /usr/lib/systemd/systemd-logind
          0.3  0.4 1274 postfix  0 S cleanup -z -t unix -u
          0.3  0.6    1 root     0 S /usr/lib/systemd/systemd --switch
          0.3  0.4  350 root     0 S /usr/lib/systemd/systemd-journald
          0.0  0.2  795 root     0 S /sbin/dhclient -q -lf /var/lib/dh
          0.0  0.0  372 root     0 S /usr/sbin/lvmtool -f
/          0.0  0.0  28 root     5 S ksm
/boot      0.0  0.0 47876 root    0 S kworker/u256:1
_resource  0.0  0.0  277 root   -20 S xfs-cil/sda2
          0.0  0.0  278 root   -20 S xfs-reclaim/sda

```

```

[linvirt@centos01 ~]$ pidstat -p 53287 2 5
Linux 3.10.0-862.3.3.el7.x86_64 (centos01)      08/05/2018      _x86_64_      (1 CPU)

03:15:12 PM   UID      PID    %usr %system %guest   %CPU   CPU   Command
03:15:14 PM     0    53287    7.11  0.00  0.00    7.11    0   sysbench
03:15:16 PM     0    53287    8.04  0.50  0.00    8.54    0   sysbench
03:15:18 PM     0    53287    5.56  0.00  0.00    5.56    0   sysbench
03:15:20 PM     0    53287    7.50  0.00  0.00    7.50    0   sysbench
03:15:22 PM     0    53287    8.04  0.00  0.00    8.04    0   sysbench
Average:         0    53287    7.25  0.10  0.00    7.35    -   sysbench

```

```

[linvirt@centos01 ~]$ iostat -dh 1 /dev/sda 1
Linux 3.10.0-862.3.3.el7.x86_64 (centos01)      08/05/2018      _x86_64_      (1 CPU)

Device:            tps    kB_read/s    kB_wrtn/s    kB_read    kB_wrtn
sda
                19.72         744.20         1530.29    4880180    10035037

```

```
[root@centos01 sa]# sadf -s 15:20:00 -e 15:40:00 /var/log/sa/sa03
localhost.localdomain 598 2018-08-03 15:30:01 UTC all %user 2.61
localhost.localdomain 598 2018-08-03 15:30:01 UTC all %nice 0.00
localhost.localdomain 598 2018-08-03 15:30:01 UTC all %system 0.67
localhost.localdomain 598 2018-08-03 15:30:01 UTC all %iowait 0.00
localhost.localdomain 598 2018-08-03 15:30:01 UTC all %steal 0.00
localhost.localdomain 598 2018-08-03 15:30:01 UTC all %idle 96.72
```

```
[root@centos01 sa]# dstat
You did not select any stats, using -cdngy by default.
----total-cpu-usage---- -dsk/total- -net/total- ---paging-- ---system--
usr  sys  idl  wai  hiq  siq| read  writ| recv  send| in  out | int  csw
10   2   75  14   0   0|1205k 2727k|  0    0 |  0    0 | 41  315
 1   0   99   0   0   0|  0    0 | 330B 962B|  0    0 | 22  131
 0   1   99   0   0   0|  0    0 | 66B  350B|  0    0 | 22  120
 0   1   99   0   0   0| 32k   510k| 66B  350B|  0    0 | 29  180
 7   1   92   0   0   0|  0   164k| 88k   15k|  0    0 | 62  281
 0   0  100   0   0   0|  0    0 | 66B  358B|  0    0 | 23  130
 0   0  100   0   0   0|  0    0 | 66B  350B|  0    0 | 21  119
 7   2   91   0   0   0|  0   60k| 94k   17k|  0    0 | 72  441
 1   0   99   0   0   0|  0    0 | 66B  358B|  0    0 | 26  124
 0   0  100   0   0   0|  0    0 | 66B  350B|  0    0 | 22  148
```

```
[root@centos01 sa]# ip -s link show dev eth0
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP mode DEFAULT group default qlen 1000
    link/ether 00:0d:3a:36:76:21 brd ff:ff:ff:ff:ff:ff
    RX: bytes  packets  errors  dropped  overrun  mcast
    450592991  442379   0       0         0         1
    TX: bytes  packets  errors  dropped  carrier  collsns
    70900598   225254   0       0         0         0
```

---

```
[root@centos01 sa]# nstat
#kernel
IpInReceives          682          0.0
IpInDelivers          682          0.0
IpOutRequests         905          0.0
TcpActiveOpens        113          0.0
TcpEstabResets        3            0.0
TcpInSegs             568          0.0
TcpOutSegs            847          0.0
TcpOutRsts            3            0.0
UdpInDatagrams        114          0.0
UdpOutDatagrams       112          0.0
TcpExtTW              4            0.0
TcpExtTCPHPHits       57           0.0
TcpExtTCPPureAcks     146          0.0
TcpExtTCPHPAcks       60           0.0
TcpExtTCPAbortOnClose 3            0.0
TcpExtTCPRcvCoalesce  3            0.0
TcpExtTCPAutoCorking  18           0.0
TcpExtTCPOrigDataSent 443          0.0
IpExtInOctets         1189603     0.0
IpExtOutOctets        241424      0.0
IpExtInNoECTPkts     1413         0.0
```

---

iptraf-ng 1.1.4

IP traffic monitor

**General interface statistics**

Detailed interface statistics

Statistical breakdowns...

LAN station monitor

Filters...

Configure...

About...

Exit

Displays some statistics for attached interfaces

Up/Down-Move selector Enter-execute