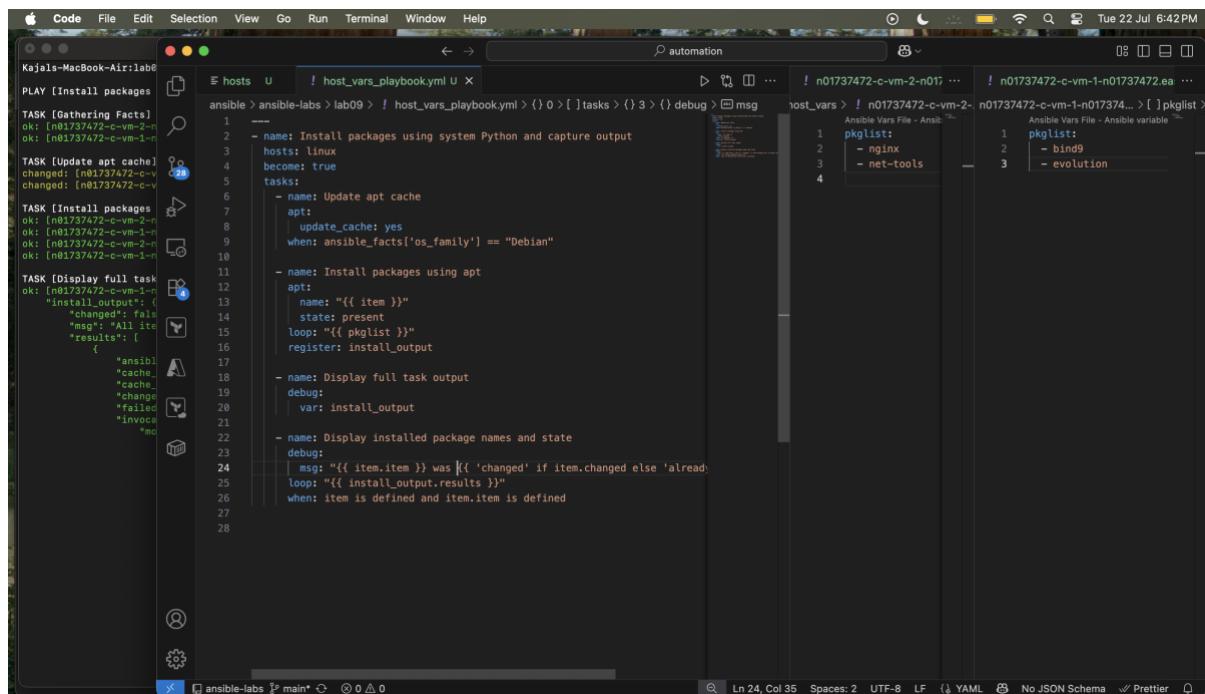


Lab 9

Section 1

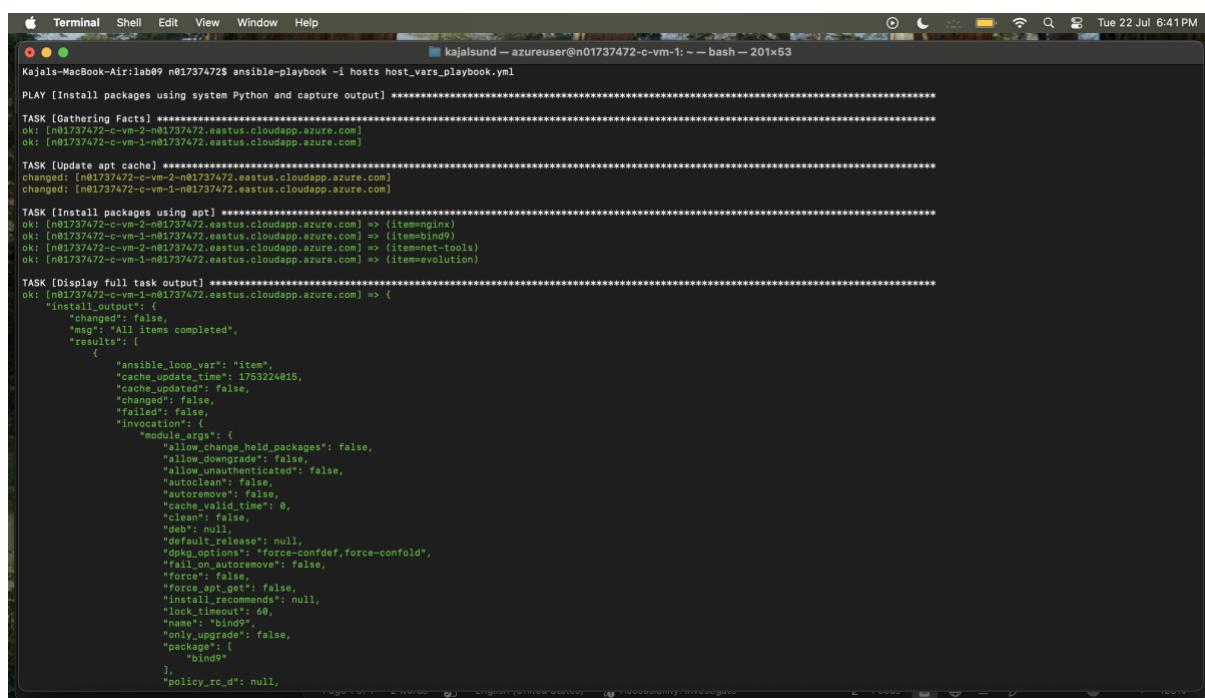
Part 1: Capture and display task output:

1. Make a copy of the playbook from Lab 08 section 03 that uses host variables
2. Use register to capture the output of the package installation task
3. Display the entire task output
4. Display the names of the packages that were installed



The code editor shows the following Ansible playbook (`host_vars_playbook.yml`):

```
PLAY [Install packages]
  TASK [Gathering Facts]
    ok: [n01737472-c-vm-2]
    ok: [n01737472-c-vm-1]
  TASK [Update apt cache]
    changed: [n01737472-c-vm-2]
    ok: [n01737472-c-vm-1]
  TASK [Install packages]
    ok: [n01737472-c-vm-2]
    ok: [n01737472-c-vm-1]
    ok: [n01737472-c-vm-2]
    ok: [n01737472-c-vm-1]
  TASK [Display full task output]
    ok: [n01737472-c-vm-1]
    "install_output": {
      "changed": false,
      "msg": "All items completed",
      "results": [
        {
          "ansible_loop_var": "item",
          "cache_update_time": 153224015,
          "cache_updated": false,
          "changed": false,
          "failed": false,
          "invocation": {
            "module_args": {
              "allow_change_held_packages": false,
              "allow_downgrade": false,
              "allow_unauthenticated": false,
              "autoremove": false,
              "cache_valid_time": 0,
              "clean": false,
              "deb": null,
              "default_releases": null,
              "debt_order": "force-confdef,force-confold",
              "fail_on_autoremove": false,
              "force": false,
              "force_apt_get": false,
              "install_recommends": null,
              "lock_timeout": 60,
              "name": "bind9",
              "only_upgrade": false,
              "package": [
                "bind9"
              ],
              "policy_rc_d": null
            }
          }
        }
      ]
    }
  
```



The terminal window shows the execution of the Ansible playbook (`host_vars_playbook.yml`) on two hosts:

```
kajals-MacBook-Air:lab09 n01737472$ ansible-playbook -i hosts host_vars_playbook.yml
PLAY [Install packages using system Python and capture output] ****
TASK [Gathering Facts] ****
ok: [n01737472-c-vm-2=n01737472.eastus.cloudapp.azure.com]
ok: [n01737472-c-vm-1=n01737472.eastus.cloudapp.azure.com]
TASK [Update apt cache] ****
changed: [n01737472-c-vm-2=n01737472.eastus.cloudapp.azure.com]
changed: [n01737472-c-vm-1=n01737472.eastus.cloudapp.azure.com]
TASK [Install packages using apt] ****
ok: [n01737472-c-vm-2=n01737472.eastus.cloudapp.azure.com] => (item=nginx)
ok: [n01737472-c-vm-1=n01737472.eastus.cloudapp.azure.com] => (item=bind9)
ok: [n01737472-c-vm-2=n01737472.eastus.cloudapp.azure.com] => (item=net-tools)
ok: [n01737472-c-vm-1=n01737472.eastus.cloudapp.azure.com] => (item=evolution)
TASK [Display full task output] ****
ok: [n01737472-c-vm-1=n01737472.eastus.cloudapp.azure.com] => (
  "ansible_loop_var": "item",
  "cache_update_time": 153224015,
  "cache_updated": false,
  "changed": false,
  "failed": false,
  "invocation": {
    "module_args": {
      "allow_change_held_packages": false,
      "allow_downgrade": false,
      "allow_unauthenticated": false,
      "autoremove": false,
      "cache_valid_time": 0,
      "clean": false,
      "deb": null,
      "default_releases": null,
      "debt_order": "force-confdef,force-confold",
      "fail_on_autoremove": false,
      "force": false,
      "force_apt_get": false,
      "install_recommends": null,
      "lock_timeout": 60,
      "name": "bind9",
      "only_upgrade": false,
      "package": [
        "bind9"
      ],
      "policy_rc_d": null
    }
  }
)
```

```

Terminal Shell Edit View Window Help
kajalsund -- azureuser@n01737472-c-vm-1: ~ bash - 201x54
=====
"package": [
    {
        "name": "net-tools"
    }
]
"policy_rc_d": null,
"purge": false,
"state": "present",
"update_cache": null,
"update_cache_retries": 5,
"update_cache_retry_max_delay": 12,
"upgrade": null
},
"item": "net-tools"
}
],
"skipped": false
}
}

TASK [Display installed package names and state] ****
ok: [n01737472-c-vm-1:n01737472.eastus.cloudapp.azure.com] => (item={'changed': False, 'cache_updated': False, 'cache_update_time': 1753224015, 'invocation': {'module_args': {'name': 'bind9', 'state': 'present', 'package': ['bind9']}, 'update_cache_retries': 5, 'update_cache_retry_max_delay': 12, 'cache_valid_time': 0, 'purge': False, 'force': False, 'upgrade': None, 'dpkg_options': 'force-confdef,force-confold', 'autoremove': False, 'autoclean': False, 'fail_on_autoremove': False, 'only_upgrade': False, 'force_apt_get': False, 'clean': False, 'allow_unauthenticated': False, 'allow_downgrade': False, 'allow_change_held_packages': None, 'lock_timeout': 60, 'update_cache': None, 'deb': None, 'default_release': None, 'install_recommends': None, 'policy_rc_d': None}), 'failed': False, 'item': 'bind9' msg: "bind9 was already installed"
}
ok: [n01737472-c-vm-1:n01737472.eastus.cloudapp.azure.com] => (item={'changed': False, 'cache_updated': False, 'cache_update_time': 1753224015, 'invocation': {'module_args': {'name': 'nginx', 'state': 'present', 'package': ['nginx']}, 'update_cache_retries': 5, 'update_cache_retry_max_delay': 12, 'cache_valid_time': 0, 'purge': False, 'force': False, 'upgrade': None, 'dpkg_options': 'force-confdef,force-confold', 'autoremove': False, 'autoclean': False, 'fail_on_autoremove': False, 'only_upgrade': False, 'force_apt_get': False, 'clean': False, 'allow_unauthenticated': False, 'allow_downgrade': False, 'allow_change_held_packages': None, 'lock_timeout': 60, 'update_cache': None, 'deb': None, 'default_release': None, 'install_recommends': None, 'policy_rc_d': None}), 'failed': False, 'item': 'nginx' msg: "nginx was already installed"
}
ok: [n01737472-c-vm-1:n01737472.eastus.cloudapp.azure.com] => (item={'changed': False, 'cache_updated': False, 'cache_update_time': 1753224015, 'invocation': {'module_args': {'name': 'evolution', 'state': 'present', 'package': ['evolution']}, 'update_cache_retries': 5, 'update_cache_retry_max_delay': 12, 'cache_valid_time': 0, 'purge': False, 'force': False, 'upgrade': None, 'dpkg_options': 'force-confdef,force-confold', 'autoremove': False, 'autoclean': False, 'fail_on_autoremove': False, 'only_upgrade': False, 'force_apt_get': False, 'clean': False, 'allow_unauthenticated': False, 'allow_downgrade': False, 'allow_change_held_packages': None, 'lock_timeout': 60, 'update_cache': None, 'deb': None, 'default_release': None, 'install_recommends': None, 'policy_rc_d': None}), 'failed': False, 'item': 'evolution' msg: "evolution was already installed"
}
ok: [n01737472-c-vm-2:n01737472.eastus.cloudapp.azure.com] => (item={'changed': False, 'cache_updated': False, 'cache_update_time': 1753224015, 'invocation': {'module_args': {'name': 'net-tools', 'state': 'present', 'package': ['net-tools']}, 'update_cache_retries': 5, 'update_cache_retry_max_delay': 12, 'cache_valid_time': 0, 'purge': False, 'force': False, 'upgrade': None, 'dpkg_options': 'force-confdef,force-confold', 'autoremove': False, 'autoclean': False, 'fail_on_autoremove': False, 'only_upgrade': False, 'force_apt_get': False, 'clean': False, 'allow_unauthenticated': False, 'allow_downgrade': False, 'allow_change_held_packages': None, 'lock_timeout': 60, 'update_cache': None, 'deb': None, 'default_release': None, 'install_recommends': None, 'policy_rc_d': None}), 'failed': False, 'item': 'net-tools' msg: "net-tools was already installed"
}
PLAY RECAP ****
n01737472-c-vm-1:n01737472.eastus.cloudapp.azure.com : ok=5    changed=1   unreachable=0    failed=0    skipped=0   rescued=0   ignored=0
n01737472-c-vm-2:n01737472.eastus.cloudapp.azure.com : ok=5    changed=1   unreachable=0    failed=0    skipped=0   rescued=0   ignored=0
Kajals-MacBook-Air:lab89 n01737472$ 

```

Section 2

Objectives:

- Work with facts (Ansible facts and package facts)

Part 1: Capture and display Ansible facts:

1. Write a playbook and capture facts for a single node ansible-w-vm1
2. Display all the facts on the screen
3. Display only the FQDN, IPv4 address, and short hostname of the node

```

ansible > ansible-labs > lab09 > ! windows_facts.yml > () 0 > [ ] tasks > () 1 > () debug > [ ] msg
1  ---
2  - name: Capture and display all facts for Windows node
3    hosts: n01737472-w-vm1-n01737472.eastus.cloudapp.azure.com
4    gather_facts: yes
5    tasks:
6      - name: Display all gathered facts
7        debug:
8          var: ansible_facts
9
10     - name: Display computer name, domain, and IP addresses
11       debug:
12         msg:
13           - "Computer Name: {{ ansible_facts['env']['COMPUTERNAME'] | default(ansible_facts['hostname'], true) }}"
14           - "FQDN: {{ ansible_facts['fqdn'] | default('N/A') }}"
15           - "IPv4 Addresses: {{ ansible_facts['ip_addresses'] | default([]) }}"
16

```

```
Kajalsund — azureuser@n01737472-c-vm-1: ~ — bash — 170x54
[ Kajals-MacBook-Air:lab09 n01737472$ ansible-playbook -i hosts windows_facts.yml
PLAY [Capture and display all facts for Windows node] ****
TASK [Gathering Facts] ****
ok: [n01737472-w-vm1=n01737472.eastus.cloudapp.azure.com]
TASK [Display all gathered facts] ****
ok: [n01737472-w-vm1=n01737472.eastus.cloudapp.azure.com] => {
  "ansible_facts": {
    "architecture": "64-bit",
    "architecture_2": "x86_64",
    "bios_date": "12/07/2018",
    "bios_version": "890008",
    "date": "2025-07-22T23:05:07Z",
    "date_local": "2025-07-22T23:05:07.26715Z",
    "epoch": "153225507.26715",
    "epoch_int": 153225507,
    "epoch_local": "153225507.26715",
    "hour": "23",
    "iso8601": "2025-07-22T23:05:07Z",
    "iso8601_basic": "20250722T230507Z",
    "iso8601_basic_short": "20250722T230507",
    "iso8601_micro": "2025-07-22T23:05:07.267153Z",
    "minute": "05",
    "month": "07",
    "second": "07",
    "time": "23:05:07",
    "tz": "UTC",
    "tz_offset": "+00:00",
    "weekday": "Tuesday",
    "weekday_number": "2",
    "weeknumber": "29",
    "year": "2025"
  },
  "distribution": "Microsoft Windows Server 2019 Datacenter",
  "distribution_major_version": "10",
  "distribution_version": "10.0.17763.0",
  "domain": "",
  "env": {
    "ALLUSERSPROFILE": "C:\ProgramData",
    "APPDATA": "C:\Users\azureadmin\AppData\Roaming",
    "COMPUTERNAME": "n01737472-w-vm1",
    "ComSpec": "C:\Windows\system32\cmd.exe",
    "CommonProgramFiles": "C:\Program Files\Common Files",
    "CommonProgramFiles(x86)": "C:\Program Files (x86)\Common Files",
    "CommonProgramW6432": "C:\Program Files\Common Files",
    "CommonData": "C:\Windows\System32\Drivers\DriverData",
    "LOCALAPPDATA": "C:\Users\azureadmin\AppData\Local",
    "NUMBER_OF_PROCESSORS": "1",
    "OS": "Windows_NT",
    "PATHEXT": ".COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC;.CPL",
    "Path": "C:\Windows\system32;C:\Windows;C:\Windows\System32\Wbem;C:\Windows\System32\WindowsPowerShell\v1.0\;C:\Windows\System32\OpenSSH\;C:\Windows\System32\WindowsPowerShell\v1.0\Modules\",
    "PUBLIC": "C:\Users\Public",
    "SystemRoot": "C:\Windows",
    "TEMP": "C:\Users\AZUREA-1\AppData\Local\Temp",
    "TMP": "C:\Users\AZUREA-1\AppData\Local\Temp",
    "USERDOMAIN": "n01737472-w-vm1",
    "USERNAME": "azureadmin",
    "USERPROFILE": "C:\Users\azureadmin",
    "windir": "C:\Windows"
  },
  "fqdn": "n01737472-w-vm1",
  "gather_subset": [
    "all"
  ],
  "hostname": "n01737472-w-vm1",
  "interfaces": [
    {
      "connection_name": "Ethernet",
      "default_gateway": "10.0.2.1",
      "dns_domain": "0q001mqyb4evav15tnygp3wha.bx.internal.cloudapp.net",
      "interface_index": 6,
      "interface_name": "Microsoft Hyper-V Network Adapter",
      "ipv4": {
        "address": "10.0.2.4",
        "prefix": "24"
      },
      "ipv6": {
        "address": "fe80::4535:489d:663:fb06%6",
        "prefix": "64"
      },
      "macaddress": "00:0D:3A:19:0D:DF",
      "mtu": 1500,
      "speed": 100000
    }
  ],
  "ip_addresses": [
    "fe80::4535:489d:663:fb06%6",
    "fe80::4535:489d:663:fb06%6"
  ]
}
```

```
Kajalsund — azureuser@n01737472-c-vm-1: ~ — bash — 170x54
[ Kajals-MacBook-Air:lab09 n01737472$ ansible-playbook -i hosts windows_facts.yml
PLAY [Capture and display all facts for Windows node] ****
TASK [Gathering Facts] ****
ok: [n01737472-w-vm1=n01737472.eastus.cloudapp.azure.com]
TASK [Display all gathered facts] ****
ok: [n01737472-w-vm1=n01737472.eastus.cloudapp.azure.com] => {
  "ansible_facts": {
    "OS": "Windows_NT",
    "PATHEXT": ".COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC;.CPL",
    "PROCESSOR_ARCHITECTURE": "AMD64",
    "PROCESSOR_IDENTIFIER": "Intel64 Family 6 Model 106 Stepping 6, GenuineIntel",
    "PROCESSOR_LEVEL": "6",
    "PROCESSOR_REVISION": "6a06",
    "PROMPT": "$PS$",
    "PSEXecutionPolicyPreference": "Unrestricted",
    "PSModulePath": "C:\Users\azureadmin\Documents\WindowsPowerShell\Modules;C:\Program Files\WindowsPowerShell\Modules;C:\Windows\system32\WindowsPowerShell\Modules\",
    "PUBLIC": "C:\Users\Public",
    "Path": "C:\Windows\system32;C:\Windows;C:\Windows\System32\Wbem;C:\Windows\System32\WindowsPowerShell\v1.0\;C:\Windows\System32\OpenSSH\;C:\Windows\System32\WindowsPowerShell\v1.0\Modules\",
    "SystemRoot": "C:\Windows",
    "TEMP": "C:\Users\AZUREA-1\AppData\Local\Temp",
    "TMP": "C:\Users\AZUREA-1\AppData\Local\Temp",
    "USERDOMAIN": "n01737472-w-vm1",
    "USERNAME": "azureadmin",
    "USERPROFILE": "C:\Users\azureadmin",
    "windir": "C:\Windows"
  },
  "fqdn": "n01737472-w-vm1",
  "gather_subset": [
    "all"
  ],
  "hostname": "n01737472-w-vm1",
  "interfaces": [
    {
      "connection_name": "Ethernet",
      "default_gateway": "10.0.2.1",
      "dns_domain": "0q001mqyb4evav15tnygp3wha.bx.internal.cloudapp.net",
      "interface_index": 6,
      "interface_name": "Microsoft Hyper-V Network Adapter",
      "ipv4": {
        "address": "10.0.2.4",
        "prefix": "24"
      },
      "ipv6": {
        "address": "fe80::4535:489d:663:fb06%6",
        "prefix": "64"
      },
      "macaddress": "00:0D:3A:19:0D:DF",
      "mtu": 1500,
      "speed": 100000
    }
  ],
  "ip_addresses": [
    "fe80::4535:489d:663:fb06%6",
    "fe80::4535:489d:663:fb06%6"
  ]
}
```

```

new Window Help
kajalsund — azureuser@n01737472-c-vm-1: ~ bash — 234x72
[{"address": "fe80::4535:489d:663:fb06%6", "prefix": "64"}, {"macaddress": "00:00:3a:19:00:0f", "mtu": 1500, "speed": 100000}, {"ip_addresses": [{"ip": "10.0.2.15", "mac": "00:00:3a:19:00:0f", "netmask": "255.255.255.0", "prefix": "24"}, {"ip": "10.0.2.4", "mac": "00:00:3a:19:00:0f", "netmask": "255.255.255.0", "prefix": "24"}], "kernel": "4.15.0-105-generic", "lastboot": "2025-07-22 21:03:14Z", "machine_id": "5-1-0-21-328426954-685515162-3448434399", "memory_mb": 2416, "model": "VMware VM", "module_setup": true, "netbios_name": "n01737472-w-vm1", "node": "n01737472-w-vm1", "os_family": "Windows", "os_install_date": "2025-07-22T21:04:19Z", "os_install_type": "Server", "os_name": "Microsoft Windows Server 2019 Datacenter", "os_product_type": "server", "owner_contact": "", "owner_email": "", "pagefilefaas_mb": 194, "pagefiletotal_mb": 512, "powershell_version": 5, "processor_cores": 1, "processor_count": 1, "processor_max_mhz_per_core": 1, "processor_vcpus": 1, "product_name": "Virtual Machine", "product_uuid": "00000000-0000-0000-0000-000000000000", "reboot_pending": true, "swaptotal_mb": 0, "system_windows": "", "system_description": "", "system_vendor": "Microsoft Corporation", "uptime_seconds": 7314, "user": "Administrator", "user_gecos": "", "user_id": "azureadmin", "user_login": "n01737472-w-vm1", "user_password": "2260269954-685515162-3448434399-580", "virtualization_role": "guest", "virtualization_type": "Hyper-V", "windows_domain": "MORGRUDUP", "windows_domain_domain": false, "windows_domain_user": "Stand-alone server"}, {"ok": 1, "changed": 0, "unreachable": 0, "failed": 0, "skipped": 0, "rescued": 0, "ignored": 0}], PLAY RECAP n01737472-w-vm1 : ok=3 changed=0 unreachable=0 failed=0 skipped=0 rescued=0 ignored=0
Kajal-MacBook-Air:lab09 n01737472
Disk 0: 129% Page 3 of 3 55 words English (United States) Accessibility: Investigate Focus + 129%

```

Part 2: Capture and display package facts:

- Write a playbook to list the version of a single package called setup from ansible-c-vm1

```

ion View Go Run Terminal Window Help
automation
hosts: ! main.tf M ! host_vars_playbook.yml U ! linux_facts.yml U ! windows_facts.yml U
ansible > ansible-labs > lab09 > ! linux_facts.yml > {} > [ ] tasks > {} > name
  1 ---
  2   - name: Capture and display package facts on a single Linux node
  3     hosts: n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com
  4     gather_facts: yes
  5     tasks:
  6       - name: Display all gathered facts
  7         debug:
  8           var: ansible_facts
  9
 10      - name: Display FQDN, IPv4 address, and short hostname
 11        debug:
 12          msg:
 13            - "FQDN: {{ ansible_facts['fqdn'] }}"
 14            - "IPv4 Address: {{ ansible_facts['all_ipv4_addresses'] }}"
 15            - "Short Hostname: {{ ansible_facts['hostname'] }}"
 16
 17      - name: Get package facts for 'setup' package on a single Linux node
 18        hosts: n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com
 19        gather_facts: no
 20        tasks:
 21          - name: Get package facts
 22            package_facts:
 23              manager: auto
 24
 25          - name: Show version of package 'setup'
 26            debug:
 27              msg: "{{ ansible_facts.packages['setup'] if 'setup' in ansible_facts.packages else 'Package not found' }}"

```

```

new Window Help
kajalsund -- azureuser@n01737472-c-vm-1: ~ -- bash - 204x52
Q package

[Kajal's-MacBook-Air:lab09 n01737472$ ansible-playbook -i hosts linux_facts.yml
PLAY [Capture and display package facts on a single Linux node] ****
TASK [Gathering Facts] ****
ok: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com]
TASK [Display all gathered facts] ****
ok: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => {
    "ansible_facts": {
        "all_ipv4_addresses": [
            "10.0.1.4"
        ],
        "all_ipv6_addresses": [
            "fe80::222:48ff:fe33:3256"
        ],
        "ansible_local": {},
        "apparmor": {
            "status": "enabled"
        },
        "architecture": "x86_64",
        "bios_date": "03/08/2024",
        "bios_vendor": "Microsoft Corporation",
        "bios_version": "Hyper-V UEFI Release v4.1",
        "board_asset_tag": "None",
        "board_name": "Virtual Machine",
        "board_serial": "NA",
        "board_vendor": "Microsoft Corporation",
        "board_version": "Hyper-V UEFI Release v4.1",
        "chassis_asset_tag": "7783-7084-3265-9085-8269-3286-77",
        "chassis_serial": "NA",
        "chassis_vendor": "Microsoft Corporation",
        "chassis_version": "Hyper-V UEFI Release v4.1",
        "cmdline": {
            "BOOT_IMAGE": "/boot/vmlinuz-6.8.0-1031-azure",
            "console": "ttyS0",
            "earlyprintk": "ttyS0",
            "nvme_core.io_timeout": "240",
            "panic": "-1",
            "ro": true,
            "root": "PARTUUID=c22d911d-03e7-439d-8cbf-55004b28b5ad"
        },
        "date_time": {
            "date": "2025-07-22",
            "day": "22",
            "epoch": "1753226854",
            "epoch_int": "1753226854",
            "hour": "23",
            "iso8601": "2025-07-22T23:14:14Z",
            "iso8601_basic": "20250722T231414Z",
            "iso8601_basic_short": "20250722T231414"
        }
    }
}
new Window Help
kajalsund -- azureuser@n01737472-c-vm-1: ~ -- bash - 204x52
Q package

["avx512vl",
 "xsaveopt",
 "xsavec",
 "xsavew",
 "md_clear"
],
"form_factor": "Desktop",
"fqdn": "n01737472-c-vm-1.internal.cloudapp.net",
"gather_subset": [
    "all"
],
"hostname": "n01737472-c-vm-1",
"hostqn": "nqn.2014-08.org.nvmeexpress:uuid:9aaa990b-9dac-4f5f-ae70-7083bcd04b5",
"interfaces": [
    "lo",
    "eth0"
],
"is_chroot": false,
"iscsi_iqn": "",
"kernel": "6.8.0-1031-azure",
"kernel_version": "#36-22.04.1-Ubuntu SMP Tue Jul 1 03:54:01 UTC 2025",
"lo": {
    "active": true,
    "device": "lo",
    "features": {
        "esp_hw_offload": "off [fixed]",
        "esp_tx_csum_hw_offload": "off [fixed]",
        "fco_mtu": "off [fixed]",
        "generic_receive_offload": "on",
        "generic_segmentation_offload": "on",
        "highdma": "on [fixed]",
        "hsr_dup_offload": "off [fixed]",
        "hsr_fwd_offload": "off [fixed]",
        "hsr_tag_ins_offload": "off [fixed]",
        "hsr_tag_rm_offload": "off [fixed]",
        "hw_tc_offload": "off [fixed]",
        "l2_fwd_offload": "off [fixed]",
        "large_receive_offload": "off [fixed]",
        "loopback": "off [fixed]",
        "macsec_hw_offload": "off [fixed]",
        "nets_local": "on [fixed]",
        "ntuple_filters": "off [fixed]",
        "receive_hashing": "off [fixed]",
        "rx_all": "off [fixed]",
        "rx checksumming": "on [fixed]",
        "rx_fcs": "off [fixed]",
        "rx_gro_hw": "off [fixed]",
        "rx_gro_list": "off",
        "rx_udp_gro_forwarding": "off",
        "rx_udp_tunnel_port_offload": "off [fixed]",
        "rx_vlan_filter": "off [fixed]",
        "rx_vlan_offload": "off [fixed]"
    }
}
]

```

```

File Window Help
kajalsund -- azureuser@n01737472-c-vm-1: ~ - bash - 204x52
Q package
  "system": "Linux",
  "system_capabilities": [
    {
      "system_capabilities_enforced": "True",
      "system_vendor": "Microsoft Corporation",
      "systemmd": {
        "features": "+PAM +AUDIT +SELINUX +APPARMOR +IMA +SMACK +SECCOMP +CRYPT +GNUTLS +OPENSSL +ACL +BLKID +CURL +ELFUTILS +FIDO2 +IDN +IPTC +KMOD +LIBCRYPTSET
P11KIT -QRENCODE +BZIP2 +LZ4 +XZ +ZLIB +ZSTD -XKBCOMMON +UTMP +SYSVINIT default-hierarchy=unified",
        "version": "249"
      },
      "uptime_seconds": 2438,
      "user_dir": "/home/azureuser",
      "user_gecos": "Ubuntu",
      "user_gid": 1000,
      "user_id": "azureuser",
      "user_shell": "/bin/bash",
      "user_uid": 1000,
      "userspace_architecture": "x86_64",
      "userspace_bits": "64",
      "virtualization_role": "guest",
      "virtualization_tech_guest": [
        "VirtualPC"
      ],
      "virtualization_tech_host": [],
      "virtualization_type": "VirtualPC"
    }
  }
}

TASK [Display FQDN, IPv4 address, and short hostname] ****
ok: [n01737472-c-vm-1-n@n01737472.eastus.cloudapp.azure.com] => {
  "msg": [
    {
      "FQDN": "n01737472-c-vm-1.internal.cloudapp.net",
      "IPv4 Address": "[10.0.1.4]",
      "Short Hostname": "n01737472-c-vm-1"
    }
  ]
}

PLAY [Get package facts for 'setup' package on a single Linux node] ****
TASK [Get package facts] ****
ok: [n01737472-c-vm-1-n@n01737472.eastus.cloudapp.azure.com]

TASK [Show version of package 'setup'] ****
ok: [n01737472-c-vm-1-n@n01737472.eastus.cloudapp.azure.com] => {
  "msg": "Package not found"
}

PLAY RECAP ****
n01737472-c-vm-1-n@n01737472.eastus.cloudapp.azure.com : ok=5    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
Kajals-MacBook-Air:lab09 n01737472$ █

```

Section 3

Objectives:

- Demonstrate the use of conditions in task execution

Part 1: Demonstrate conditional task execution 1:

1. Write a playbook to install the nmap package only if it is defined in the playbook
2. Run this playbook against ansible-c-vm1

```

File View Go Run Terminal Window Help
automation
! install_nmap.yml U X
ansible > ansible-labs > lab09 > ! install_nmap.yml > {} 0 > {} vars
1   ---
2   - name: Install nmap conditionally
3     hosts: n01737472-c-vm-1-n@n01737472.eastus.cloudapp.azure.com
4     become: yes
5     vars:
6       | install_nmap: true # Set to true to install nmap, false to skip
7
8     tasks:
9       - name: Install nmap if install_nmap is defined and true
10         apt:
11           name: nmap
12           state: present
13           update_cache: yes
14         when: install_nmap is defined and install_nmap
15

```

```

Kajals-MacBook-Air:lab09 n01737472$ ansible-playbook -i hosts install_nmap.yml
PLAY [Install nmap conditionally] ****
TASK [Gathering Facts] ****
ok: [n01737472-c-vm-1-n@n01737472.eastus.cloudapp.azure.com]
[TASK [Install nmap if install_nmap is defined and true]] ****
changed: [n01737472-c-vm-1-n@n01737472.eastus.cloudapp.azure.com]
PLAY RECAP ****
n01737472-c-vm-1-n@n01737472.eastus.cloudapp.azure.com : ok=2    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
Kajals-MacBook-Air:lab09 n01737472$ █

```

Part 2: Demonstrate conditional task execution 2:

1. Write a playbook to show which nodes have <HumberID> existed
2. Run this playbook against linux inventory group

The screenshot shows a code editor window with two files open. The left file, `check_user.yml`, contains the following YAML code:

```
! check_user.yml U × ! conditional_blockinfile.yml U
ansible > ansible-labs > lab09 > ! check_user.yml > {} 0 > [ ] tasks > {} 2
1 ---
2   - name: Check if Humber ID exists on nodes
3     hosts: linux
4     gather_facts: yes
5     tasks:
6       - name: Check if user with Humber ID exists
7         ansible.builtin.shell: id n01737472
8         register: humber_user_check
9         ignore_errors: true
10
11      - name: Display result only if user exists
12        debug:
13          msg: "User n01737472 exists on {{ inventory_hostname }}"
14          when: humber_user_check.rc == 0
15
16      - name: Display result only if user does NOT exist
17        debug:
18          msg: "User n01737472 does NOT exist on {{ inventory_hostname }}"
19          when: humber_user_check.rc != 0
20
```

The screenshot shows a terminal window with the following output:

```
Kajalsund-MacBook-Air:lab09 n01737472$ ansible-playbook -i hosts check_user.yml
PLAY [Check if Humber ID exists on nodes] ****
TASK [Gathering Facts] ****
ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com]
ok: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com]

TASK [Check if user with Humber ID exists] ****
fatal: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com]: FAILED! => {"changed": true, "cmd": "id n01737472", "delta": "0:00:00.005523", "end": "2025-07-22 23:22:45.779885", "msg": "non-zero return code", "rc": 1, "start": "2025-07-22 23:22:45.773562", "stderr": "id: n01737472: no such user", "stderr_lines": ["id: n01737472: no such user"], "stdout": "", "stdout_lines": []}
...ignoring
fatal: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com]: FAILED! => {"changed": true, "cmd": "id n01737472", "delta": "0:00:00.006153", "end": "2025-07-22 23:22:45.803834", "msg": "non-zero return code", "rc": 1, "start": "2025-07-22 23:22:45.797681", "stderr": "id: n01737472: no such user", "stderr_lines": ["id: n01737472: no such user"], "stdout": "", "stdout_lines": []}
...ignoring

TASK [Display result only if user exists] ****
skipping: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com]
skipping: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com]

TASK [Display result only if user does NOT exist] ****
ok: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => {
  "msg": "User n01737472 does NOT exist on n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com"
}
ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => {
  "msg": "User n01737472 does NOT exist on n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com"
}

PLAY RECAP ****
n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com : ok=3    changed=1    unreachable=0    failed=0    skipped=1    rescued=0    ignored=1
n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com : ok=3    changed=1    unreachable=0    failed=0    skipped=1    rescued=0    ignored=1

Kajalsund-MacBook-Air:lab09 n01737472$
```

Part 3: Demonstrate conditional task execution 3:

1. Write a playbook to add the string This is my CentOS VM to the /tmp/conditional file only if the RHEL version is 8.2 and the kernel version is 4.18.0-193.el8.x86_64. Hint: use the blockinfile module.
2. Run this playbook against linux inventory group

```

! check_user.yml U ! conditional_blockinfile.yml U
ansible > ansible-labs > lab09 > ! conditional_blockinfile.yml > {} 0 > [ ]tasks > {} 0 > [ ]when
1 ---
2   - name: Add string to file if RHEL version is 8.2 and kernel version is 4.18.0-193.el8.x86_64
3     hosts: linux
4     gather_facts: yes
5     tasks:
6       - name: Add line only if RHEL and kernel version match
7         ansible.builtin.blockinfile:
8           path: /tmp/conditional
9           block: |
10             This is my CentOS VM
11     when:
12       - ansible_distribution == "RedHat"
13       - ansible_distribution_version == "8.2"
14       - ansible_kernel == "4.18.0-193.el8.x86_64"
15

```

```

! View Window Help
kajalsund - azureuser@n01737472-c-vm-1: ~ -- bash - 174x53
Kajals-MacBook-Air:lab09 n01737472$ ansible-playbook -i hosts conditional_blockinfile.yml

PLAY [Add string to file if RHEL version is 8.2 and kernel version is 4.18.0-193.el8.x86_64] ****
TASK [Gathering Facts] ****
ok: [n01737472-c-vm-1=n01737472.eastus.cloudapp.azure.com]
ok: [n01737472-c-vm-1=n01737472.eastus.cloudapp.azure.com]

TASK [Add line only if RHEL and kernel version match] ****
skipping: [n01737472-c-vm-1=n01737472.eastus.cloudapp.azure.com]
skipping: [n01737472-c-vm-2=n01737472.eastus.cloudapp.azure.com]

PLAY RECAP ****
n01737472-c-vm-1=n01737472.eastus.cloudapp.azure.com : ok=1    changed=0    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
n01737472-c-vm-2=n01737472.eastus.cloudapp.azure.com : ok=1    changed=0    unreachable=0    failed=0    skipped=1    rescued=0    ignored=0
Kajals-MacBook-Air:lab09 n01737472$ 
Kajals-MacBook-Air:lab09 n01737472$ 

```

Section 4

Objectives:

- Demonstrate the use of loops in task execution

Part 1: Demonstrate task iteration 1:

1. Write a playbook to create 10 user accounts called user101 to user110 using loop and group vars. Define custom UIDs 5001 to 5010 respectively.
2. Run this playbook against linux group nodes

```

! linux.yml U ! create_users.yml U
ansible > ansible-labs > lab09 > group_vars > ! linux.yml > [ ]users
Ansible Vars File - Ansible variables File (vars.json)
1 users:
2   - { name: user101, uid: 5001 }
3   - { name: user102, uid: 5002 }
4   - { name: user103, uid: 5003 }
5   - { name: user104, uid: 5004 }
6   - { name: user105, uid: 5005 }
7   - { name: user106, uid: 5006 }
8   - { name: user107, uid: 5007 }
9   - { name: user108, uid: 5008 }
10  - { name: user109, uid: 5009 }
11  - { name: user110, uid: 5010 }

ansible > ansible-labs > lab09 > ! create_users.yml > {} 0 > [ ]tasks > {} 0
1 ---
2   - name: Create user accounts with custom UIDs
3     hosts: linux
4     become: yes
5
6     tasks:
7       - name: Create users with loop
8         ansible.builtin.user:
9           name: "{{ item.name }}"
10          uid: "{{ item.uid }}"
11          state: present
12        loop: "{{ users }}"
13

```

```

ell Edit View Window Help
kajalsund — azureuser@n01737472-c-vm-1: ~ bash — 182x53
Kajals-MacBook-Air:lab09 n01737472$ ansible-playbook -i hosts create_users.yml
PLAY [Create user accounts with custom UIDs] ****
TASK [Gathering Facts] ****
[ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com]
ok: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com]

TASK [Create users with loop] ****
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user101', 'uid': 5001})
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user101', 'uid': 5001})
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user102', 'uid': 5002})
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user102', 'uid': 5002})
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user103', 'uid': 5003})
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user103', 'uid': 5003})
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user104', 'uid': 5004})
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user104', 'uid': 5004})
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user105', 'uid': 5005})
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user105', 'uid': 5005})
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user106', 'uid': 5006})
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user106', 'uid': 5006})
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user107', 'uid': 5007})
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user107', 'uid': 5007})
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user108', 'uid': 5008})
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user108', 'uid': 5008})
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user109', 'uid': 5009})
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user109', 'uid': 5009})
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user110', 'uid': 5010})
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com] => (item={'name': 'user110', 'uid': 5010})

PLAY RECAP ****
n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com : ok=2    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com : ok=2    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

```

Part 2: Demonstrate task iteration 2:

1. Write a playbook to use ansible_mounts to install mariadb, dracut, and snappy packages only if the / file system is mounted and has 2GB of free disk space available.
2. Use host vars to define packages
3. Run this playbook against ansible-c-vm2

```

! n01737472-c-vm-2-n01737472 > ! n01737472-c-vm-2-n01737472
ansible > ansible-labs > lab09 > ! install_packages_based_on_mount.yml U X
  1 --- 
  2   - name: Install packages only if root mount has enough space
  3     hosts: n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com
  4     become: yes
  5     gather_facts: yes
  6 
  7     tasks:
  8       - name: Check if / has >= 2GB available
  9         set_fact:
 10           install_condition: "{{ item.size_available | int >= 2147483648 }}"
 11           when: item.mount == '/'
 12           loop: "{{ ansible_mounts }}"
 13 
 14       - name: Install packages if condition is met
 15         ansible.builtin.package:
 16           name: "{{ item }}"
 17           state: present
 18           loop: "{{ packages }}"
 19           when: install_condition | default(false)
 20

```

```

Kajals-MacBook-Air:lab09 n01737472$ ansible-playbook -i hosts install_packages_based_on_mount.yml
PLAY [Install packages only if root mount has enough space] ****
TASK [Gathering Facts] ****
ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com]

TASK [Check if / has > 2GB available] ****
ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'mount': '/', 'device': '/dev/root', 'fstype': 'ext4', 'options': 'rw,relatime,discard,errors=remount-ro', 'dump': 0, 'passno': 0, 'size_total': 31025332224, 'size_available': 29101404160, 'block_size': 4096, 'block_total': 7574544, 'block_available': 7104835, 'block_used': 469709, 'inode_total': 3876720, 'inode_used': 3796842, 'uid': '38802c0bd-b1f5-4119-b2eb-258d1eecc4c'})
skipping: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'mount': '/snap/cora28/2599', 'device': '/dev/loop8', 'fstype': 'squashfs', 'options': 'ro,nodev,relatime,errors=continue,threads=single', 'dump': 0, 'passno': 0, 'size_total': 66977792, 'size_available': 0, 'block_size': 131072, 'block_total': 511, 'block_k_available': 0, 'block_used': 511, 'inode_total': 11901, 'inode_available': 0, 'inode_used': 11901, 'uid': 'N/A'})
skipping: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'mount': '/snap/ldx/31333', 'device': '/dev/loop1', 'fstype': 'squashfs', 'options': 'ro,nodev,relatime,errors=continue,threads=single', 'dump': 0, 'passno': 0, 'size_total': 93847552, 'size_available': 0, 'block_size': 131072, 'block_total': 716, 'block_available': 0, 'block_used': 716, 'inode_total': 961, 'inode_available': 0, 'inode_used': 961, 'uid': 'N/A'})
skipping: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'mount': '/snap/snapd/24792', 'device': '/dev/loop2', 'fstype': 'squashfs', 'options': 'ro,nodev,relatime,errors=continue,threads=single', 'dump': 0, 'passno': 0, 'size_total': 51773448, 'size_available': 0, 'block_size': 131072, 'block_total': 395, 'block_k_available': 0, 'block_used': 395, 'inode_total': 616, 'inode_available': 0, 'inode_used': 616, 'uid': 'N/A'})
skipping: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'mount': '/boot/efi', 'device': '/dev/sda15', 'fstype': 'vfat', 'options': 'rw,relatime,fsck=0,mask=0x77,codepage=437,iocharset=iso8859-1,shortname=mixed,errors=remount-ro', 'dump': 0, 'passno': 0, 'size_total': 109395456, 'size_available': 103053312, 'block_size': 512, 'block_total': 213663, 'block_available': 201276, 'block_used': 12387, 'inode_total': 0, 'inode_available': 0, 'inode_used': 0, 'uid': '9546-CA2991'})
skipping: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item={'mount': '/mnt', 'device': '/dev/sdb1', 'fstype': 'ext4', 'options': 'rw,relatime', 'dump': 0, 'passno': 0, 'size_total': 4141580288, 'size_available': 3910131712, 'block_size': 4096, 'block_total': 1011128, 'block_available': 954622, 'block_used': 56506, 'inode_total': 262144, 'inode_available': 262132, 'inode_used': 12, 'uid': '8f705005-122e-45de-b02c-a9a646f2abb8'})
TASK [Install packages if condition is met] ****
changed: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item=mariadb-server)
ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item=dracut)
ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com] => (item=snapd)

PLAY RECAP ****
n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com : ok=3    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
Kajals-MacBook-Air:lab09 n01737472$ 
Kajals-MacBook-Air:lab09 n01737472$ 

```

Section 5

Objectives:

- Demonstrate the use of handlers

Part 1: Demonstrate the use of a single handler:

1. Write a playbook to install the Apache web server software, add hostname of the system to the /var/www/html/index.html file, enable the Apache service to auto-start on system reboots, and start the service.
2. Run this playbook against ansible-c-vm1
3. Open a browser window and enter the full DNS name of the managed node in the browser. You should see the hostname on the screen.

```

! apache_handler.yml U X  hosts U
ansible > ansible-labs > lab09 > ! apache_handler.yml > {} 0 > [ ]tasks > {} 2 > {} systemd
1 --- 
2   - name: Install and configure Apache with handler
3     hosts: n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com
4     become: yes
5     tasks:
6 
7       - name: Install Apache web server
8         apt:
9           name: apache2
10          state: present
11          notify: restart apache
12 
13       - name: Add hostname to index.html
14         copy:
15           content: "Welcome to {{ ansible_hostname }}!""
16           dest: /var/www/html/index.html
17           notify: restart apache
18 
19       - name: Enable Apache to auto-start on boot
20         systemd:
21           name: apache2
22           enabled: yes
23 
24     handlers:
25       - name: restart apache
26         systemd:
27           name: apache2
28           state: restarted
29

```

```

Kajals-MacBook-Air:lab09 n01737472$ ansible-playbook -i hosts apache_handler.yml
PLAY [Install and configure Apache with handler] ****
TASK [Gathering Facts] ****
ok: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com]

TASK [Install Apache web server] ****
[changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com]]

TASK [Add hostname to index.html] ****
[changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com]]

TASK [Enable Apache to auto-start on boot] ****
ok: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com]

RUNNING HANDLER [restart apache] ****
changed: [n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com]

PLAY RECAP ****
n01737472-c-vm-1-n01737472.eastus.cloudapp.azure.com : ok=5    changed=3    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

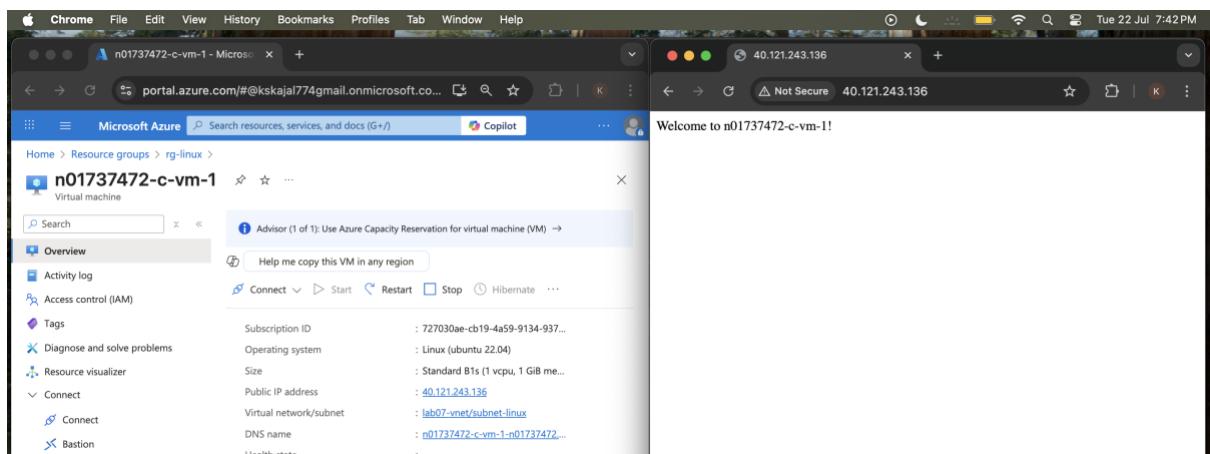
Kajals-MacBook-Air:lab09 n01737472$ curl http://40.121.242.150
^C
Kajals-MacBook-Air:lab09 n01737472$ curl http://40.121.243.136
Kajals-MacBook-Air:lab09 n01737472$ 

```

```

*** System restart required ***
Last login: Tue Jul 22 23:40:25 2025 from 142.214.83.97
[azureuser@n01737472-c-vm-1:~]$ cat /var/www/html/index.html
Welcome to n01737472-c-vm-1!azureuser@n01737472-c-vm-1:~$
[azureuser@n01737472-c-vm-1:~$]
[azureuser@n01737472-c-vm-1:~$]
azureuser@n01737472-c-vm-1:~$ 

```



Part 2: Demonstrate the use of multiple handlers:

1. Write a playbook to install the Apache web server and mariadb-server software, enable both Apache and mariadb services to auto-start on system reboots, and start both services.
2. Run this playbook against ansible-c-vm2
3. Use appropriate ad-hoc commands to display the operating state of both services.

The screenshot shows a Mac OS X desktop environment. In the top right corner, the date and time are displayed as "Tue 22 Jul 7:56 PM". Below the desktop icons, there is a terminal window titled "automation". The terminal is displaying the contents of a file named "apache_mariadb_handlers.yml". The file is an Ansible playbook with the following content:

```
! apache_mariadb_handlers.yml U X
ansible > ansible-labs > lab09 > ! apache_mariadb_handlers.yml > {} 0 > [ ] tasks > {} 3 > name
1 ---
2   - name: Install Apache and MariaDB with multiple handlers
3     hosts: n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com
4     become: yes
5     tasks:
6
7       - name: Install Apache web server
8         apt:
9           name: apache2
10          state: present
11          notify: restart apache
12
13       - name: Install MariaDB server
14         apt:
15           name: mariadb-server
16           state: present
17           notify: restart mariadb
18
19       - name: Enable Apache to auto-start on boot
20         systemd:
21           name: apache2
22           enabled: yes
23
24       - name: Enable MariaDB to auto-start on boot
25         systemd:
26           name: mariadb
27           enabled: yes
28
29     handlers:
30       - name: restart apache
31         systemd:
32           name: apache2
33           state: restarted
34
35       - name: restart mariadb
36         systemd:
37           name: mariadb
38           state: restarted
39
```

The screenshot shows a Mac OS X terminal window with the title "kajalsund — azureuser@n01737472-c-vm-2: ~ — bash — 151x53". The terminal is executing an Ansible playbook command:

```
PLAY [Install Apache and MariaDB with multiple handlers] ****
TASK [Gathering Facts] ****
[ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com]]
TASK [Install Apache web server] ****
ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com]
TASK [Install MariaDB server] ****
ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com]
TASK [Enable Apache to auto-start on boot] ****
ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com]
TASK [Enable MariaDB to auto-start on boot] ****
ok: [n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com]
PLAY RECAP ****
n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com : ok=5    changed=0    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

At the bottom of the terminal window, the user's prompt is visible: "Kajals-MacBook-Air:lab09 n01737472\$".

```
Edit View Window Help
kajalsund — azureuser@n01737472-c-vm-2: ~ bash — 180x54
Kajals-MacBook-Air:lab09 n01737472$ 
Kajals-MacBook-Air:lab09 n01737472$ 
Kajals-MacBook-Air:lab09 n01737472$ 
Kajals-MacBook-Air:lab09 n01737472$ 
Kajals-MacBook-Air:lab09 n01737472$ 
Kajals-MacBook-Air:lab09 n01737472$ clear
Kajals-MacBook-Air:lab09 n01737472$ ansible n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com -i hosts -m shell -a "systemctl status apache2" -b
n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com | CHANGED | rc=0 >
● apache2.service - The Apache HTTP Server
  Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
  Active: active (running) since Tue 2025-07-22 23:51:29 UTC; 1min 57s ago
    Docs: https://httpd.apache.org/docs/2.4/
   Process: 8957 ExecStart=/usr/sbin/apachectl start (code=exited, status=0/SUCCESS)
   Main PID: 8961 (apache2)
     Tasks: 55 (limit: 1069)
    Memory: 5.1M
      CPU: 29ms
     CGroup: /system.slice/apache2.service
           ├─8961 /usr/sbin/apache2 -k start
           ├─8962 /usr/sbin/apache2 -k start
           ├─8963 /usr/sbin/apache2 -k start
           └─8963 /usr/sbin/apache2 -k start

Jul 22 23:51:29 n01737472-c-vm-2 systemd[1]: Starting The Apache HTTP Server...
Jul 22 23:51:29 n01737472-c-vm-2 systemd[1]: Started The Apache HTTP Server.
Kajals-MacBook-Air:lab09 n01737472$ ansible n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com -i hosts -m shell -a "systemctl status mariadb" -b
n01737472-c-vm-2-n01737472.eastus.cloudapp.azure.com | CHANGED | rc=0 >
● mariadb.service - MariaDB 10.6.22 database server
  Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
  Active: active (running) since Tue 2025-07-22 23:35:42 UTC; 18min ago
    Docs: man:/usr/share/man/man8/mariadb(8)
          https://mariadb.com/kb/en/library/systemd/
   Main PID: 7480 (mariadbd)
     Status: "Taking your SQL requests now..."
     Tasks: 8 (limit: 7059)
    Memory: 73.BM
      CPU: 416ms
     CGroup: /system.slice/mariadb.service
           └─7480 /usr/sbin/mariadbd

Jul 22 23:35:42 n01737472-c-vm-2 mariadbd[7480]: Version: '10.6.22-MariaDB-0ubuntu0.22.04.1' socket: '/run/mysqld/mysqld.sock' port: 3306  Ubuntu 22.04
Jul 22 23:35:42 n01737472-c-vm-2 systemd[1]: Started MariaDB 10.6.22 database server.
Jul 22 23:35:42 n01737472-c-vm-2 /etc/mysql/debian-start[7499]: Upgrading MySQL tables if necessary.
Jul 22 23:35:42 n01737472-c-vm-2 /etc/mysql/debian-start[7502]: Looking for 'mariadb' as: /usr/bin/mariadb
Jul 22 23:35:42 n01737472-c-vm-2 /etc/mysql/debian-start[7502]: Looking for 'mariadb-check' as: /usr/bin/mariadb-check
Jul 22 23:35:42 n01737472-c-vm-2 /etc/mysql/debian-start[7502]: This installation of MariaDB is already upgraded to 10.6.22-MariaDB.
Jul 22 23:35:42 n01737472-c-vm-2 /etc/mysql/debian-start[7502]: There is no need to run mysql_upgrade again.
Jul 22 23:35:42 n01737472-c-vm-2 /etc/mysql/debian-start[7502]: You can use --force if you still want to run mysql_upgrade
Jul 22 23:35:42 n01737472-c-vm-2 /etc/mysql/debian-start[7510]: Checking for insecure root accounts.
Jul 22 23:35:42 n01737472-c-vm-2 /etc/mysql/debian-start[7514]: Triggering myisam-recover for all MyISAM tables and aria-recover for all Aria tables
Kajals-MacBook-Air:lab09 n01737472$
```