Let's talk about

Ansible Facts

Jan-Piet Mens

May 2023

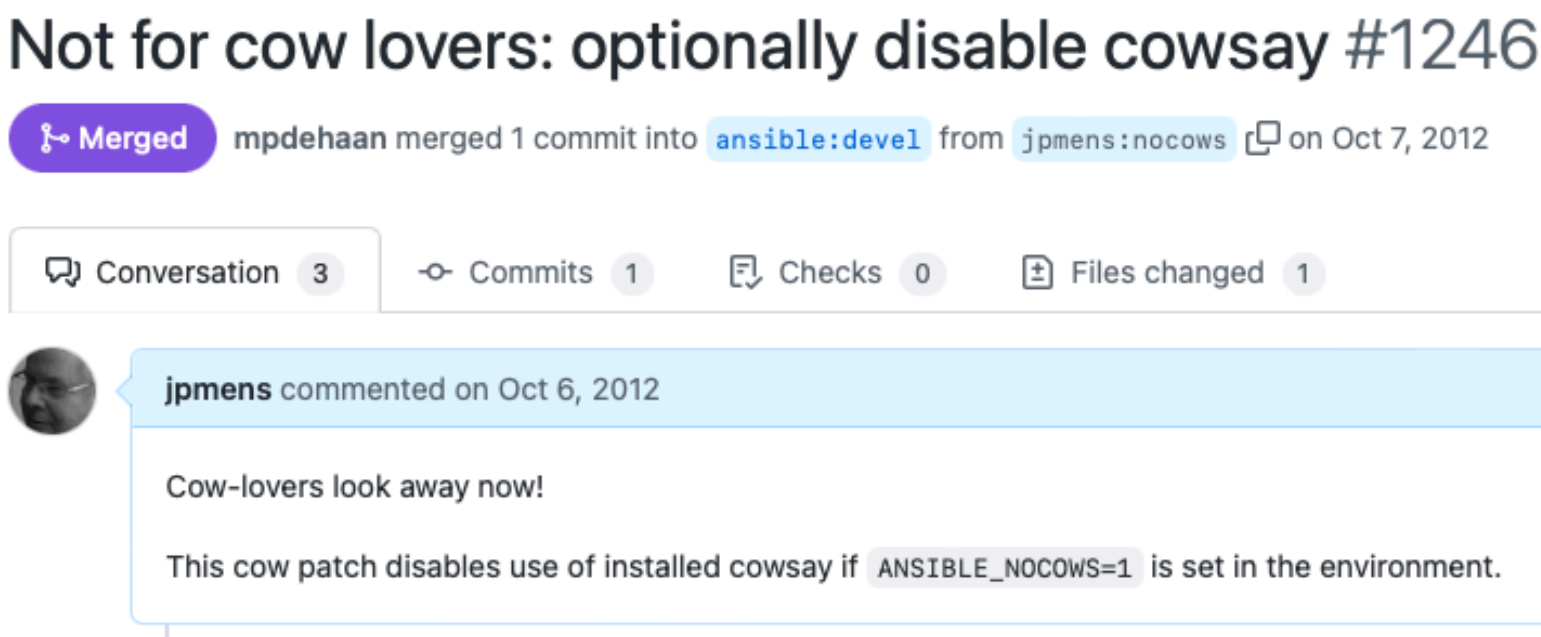
(No AI was used to generate the content of these slides.)

@jpmens@mastodon.social

NLUUG

Moo?

If you see any cows in this presentation,
I'm still making amends.



Facts

- variables related to remote systems
- obtained automatically
- can be set at runtime
- can be cached
- modules can produce them
- local facts

examples

```
ansible_architecture: "x86_64"
ansible_default_ipv4.address : "192.0.2.43"
ansible_distribution: "Debian"
ansible_windows_domain: "WORKGROUP"
ansible_hostname: "rabbit"
ansible_local.nluug.voorjaarsconferentie: "Utrecht"
```

gather facts

```
- name: "Obtain all the facts"
  hosts: unix
  gather_facts: true
  tasks:
  - copy:
        ...

  # re-gather if needed
  - setup:

  # rm *
  - meta:
      clear_facts
```

not all but **some**

```
$ ansible localhost \
                -m setup \
                -a gather_subset='!min,!all,dns'

localhost | SUCCESS => {
    "ansible_facts": {
        "ansible_dns": {
            "domain": "example.com",
            "nameservers": [
                "192.0.2.82",
                "192.0.2.1"
            ],
            "search": [
                "ww.example.com"
            ]
        }
  }
}
```

subsets

all, all_ipv4_addresses, all_ipv6_addresses,
apparmor, architecture, caps, chroot,cmdline,
date_time, default_ipv4, default_ipv6, devices,
distribution, distribution_major_version,
distribution_release, distribution_version, dns,
effective_group_ids, effective_user_id, env, facter,
fips, hardware, interfaces, is_chroot, iscsi,
kernel, local, lsb, machine, machine_id, mounts,
network, ohai, os_family, pkg_mgr, platform,
processor, processor_cores, processor_count, python,
python_version, real_user_id, selinux, service_mgr,
ssh_host_key_dsa_public, ssh_host_key_ecdsa_public,
ssh_host_key_ed25519_public,
ssh_host_key_rsa_public, ssh_host_pub_keys,
ssh_pub_keys, system, system_capabilities,
system_capabilities_enforced, **user**, **user_dir**,
user_gecos, **user_gid**, **user_id**, **user_shell**, **user_uid**,
virtual, virtualization_role, virtualization_type

minimal

apparmor, caps, cmdline, date_time,
distribution, dns, env, fips, **local**,
lsb, pkg_mgr, platform, python,
selinux, service_mgr, ssh_pub_keys,
user

printing 🐮

```
- copy:
    content: "{{ ansible_facts | to_nice_json }}"
    dest: "/tmp/facts.{{ inventory_hostname }}"
    mode: "0444"
  delegate_to: localhost
```

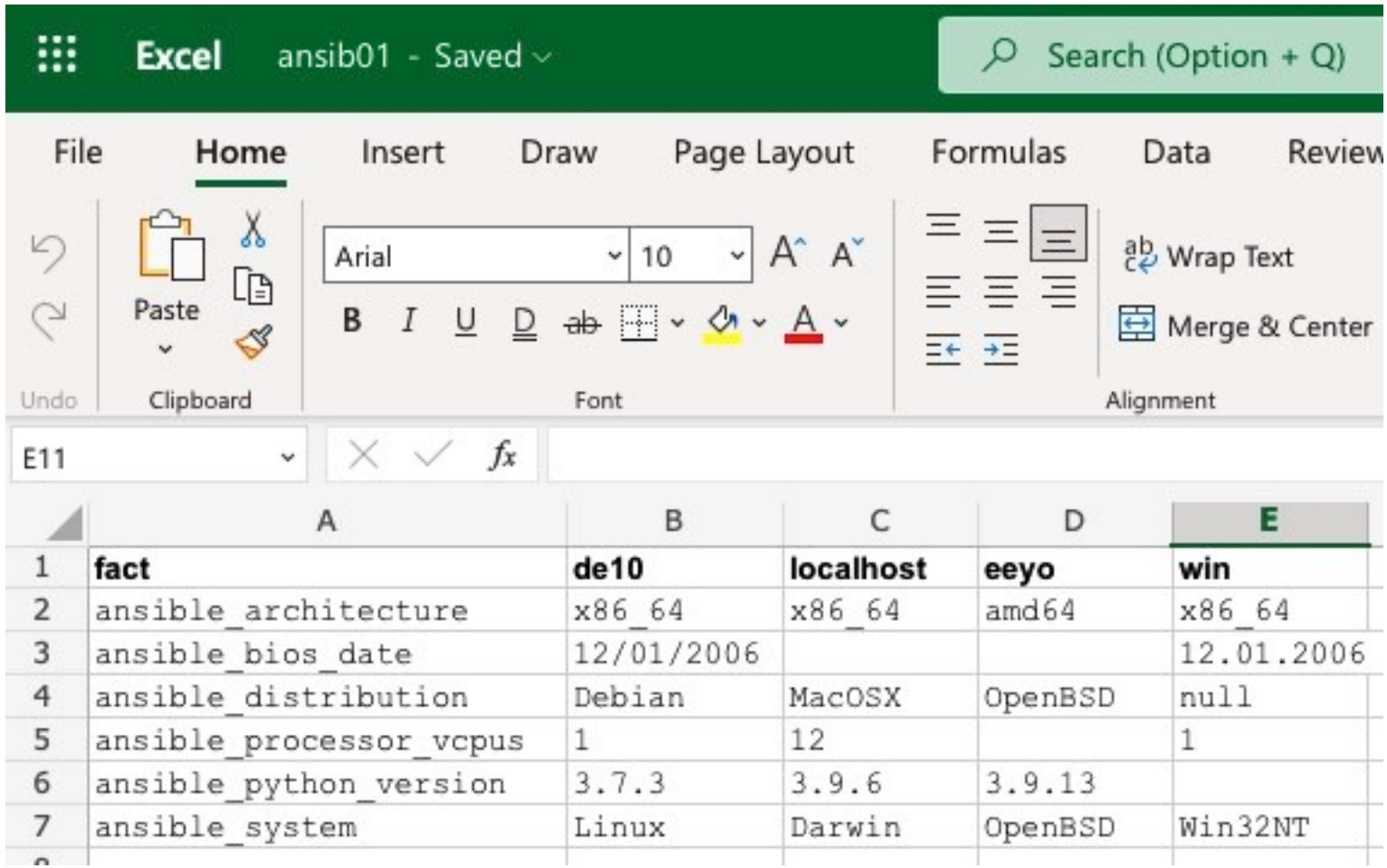

```
{
    "all_ipv4_addresses": [
        "192.168.1.140",
        "192.168.1.170"
    ],
    "all_ipv6_addresses": [
        REDACTED
    ],
    "ansible_local": {
        "hungry": {
            "dish": "rijsttafel",
```


🐮 Please consider the environment before printing facts

Fact **caching**

- store gathered facts for reuse
- default cache is `memory`
- enabled per `ansible.cfg`
- plugins: `jsonfile`, `memcached`, `pickle`, `redis`, `mongodb`, `yaml`, and your own
- plugins can be in a collection (FQCN)
- use a cache to feed your CMDB

seriously?



	A	B	C	D	E
1	**fact**	**de10**	**localhost**	**eeyo**	**win**
2	ansible_architecture	x86_64	x86_64	amd64	x86_64
3	ansible_bios_date	12/01/2006			12.01.2006
4	ansible_distribution	Debian	MacOSX	OpenBSD	null
5	ansible_processor_vcpus	1	12		1
6	ansible_python_version	3.7.3	3.9.6	3.9.13	
7	ansible_system	Linux	Darwin	OpenBSD	Win32NT

Le **cache** nouveau

```
$ cat ansible.cfg
[defaults]
gathering = smart
fact_caching = jsonfile
fact_caching_timeout = 600
fact_caching_connection = /tmp/fcache

$ ansible-playbook ...

$ jq -r .ansible_local.nluug.lunch < /tmp/fcache/localhost
karnemelk
```

set_fact

Create variables (and facts) on the fly

```
- set_fact:
    sound: moo

- set_fact:
    hotel:
      street: "Winthontlaan 4-6"
      city: "Utrecht"
      tel: 030 8000 800
    cacheable: true
```

```
$ jq  .hotel < /tmp/fcache/localhost
{
  "city": "Utrecht",
  "street": "Winthontlaan 4-6",
  "tel": "030 8000 800"
}
```

custom fact gathering

```
#!/usr/bin/env bash

unbound=$([ -x /usr/sbin/unbound ] && echo true || echo false)
cat <<EOF
{
    "ansible_facts" : {
        "resolver" : $unbound
    }
}
EOF
```

… and configure to use

```
[defaults]
facts_modules = jpfact
```

module facts

Any module can (additionally) produce facts

```
$ ansible localhost -m who
localhost | SUCCESS => {
    "ansible_facts": {
        "who": [
            "jpm",
            "root"
        ]
    },
    "changed": false,
    "fromage": "la 🐮 qui rit"
}
```

who.py

```
from ansible.module_utils.basic import AnsibleModule

if __name__ == '__main__':
    result = dict(changed = False)

    module = AnsibleModule(argument_spec=dict())

    cmd = "who | awk '{print $1}' | sort -u"
    users = module.run_command(cmd, use_unsafe_shell=True)[1]

    result["fromage"] = "la 🐮 qui rit"
    result["ansible_facts"] = {
       "who"        : users.split(),
    }

    module.exit_json(**result)
```

Local facts a.k.a **facts.d**

- files in `/etc/ansible/facts.d`
- MUST be named `*.fact` on Unix
- can contain INI or JSON
- executables emit JSON to *stdout*

https://jpmens.net/2022/10/11/ideas-for-using-ansible-local-facts/

INI facts

```
$ cat /etc/ansible/facts.d/machine.fact
[info]
location=rack49
contact=Jane

$ ansible localhost -m setup -a filter=ansible_local
localhost | SUCCESS => {
    "ansible_facts": {
        "ansible_local": {
            "machine": {
                "info": {
                    "contact": "Jane",
                    "location": "rack49"
                }
            }
        }
    }
}
```

```
Please contact {{ ansible_local.machine.info.contact }} for information.
```

groups from facts

```
- name: "Construct group from machine/info/location facts"
  hosts: unix
  gather_subset: [ "!min", "!all", "local" ]
  tasks:
  - group_by:
      key: "{{ ansible_local.machine.info.location }}"
  - meta:
      clear_facts  # if cached

- name: "Run actual play on the group"
  hosts: rack49
  gather_subset: [ "min", "all_ipv4_addresses" ]
  tasks:
  - debug:
      msg: "{{ ansible_default_ipv4.address }}"
```

constructed hosts

```
$ cat ansible.cfg
[defaults]
inventory = inventories/

[inventory]
enable_plugins = ini, constructed

$ cat inventories/zz-constr.config
---
plugin: constructed
strict: false
groups:
  zsrv: ansible_local.system.zabbix.role == "server"
  zcli: ansible_local.system.zabbix.role == "agent"
  staging: '-stag-' in inventory_hostname

keyed_groups:
  # this creates a group per machine rack
  - prefix: loc
    key: ansible_local.machine.info.location
```

via Kevin

facts on **Windows**

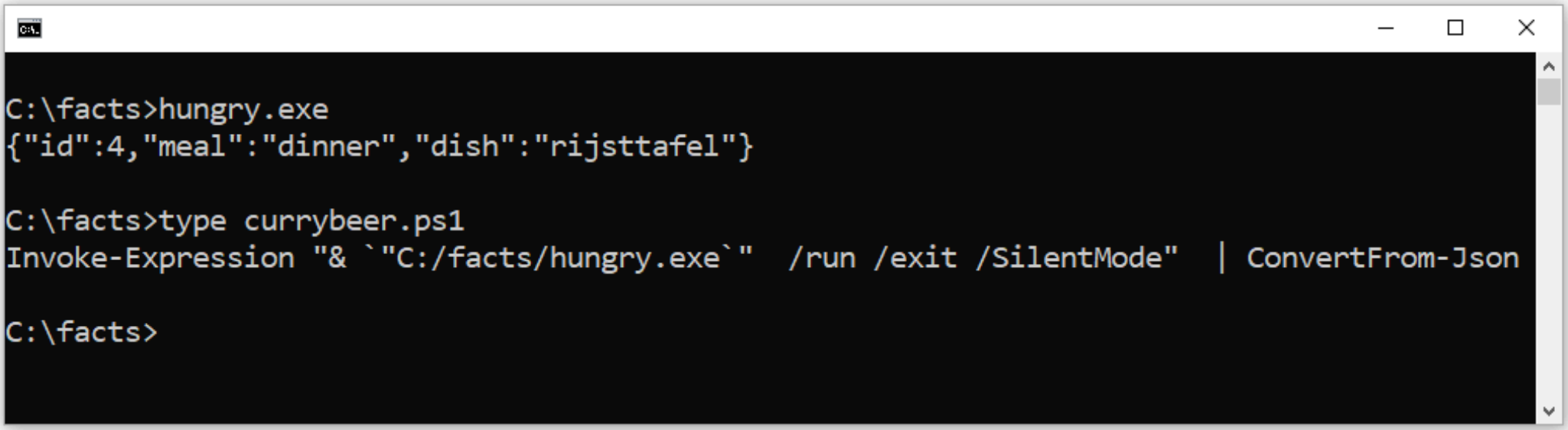
- no standard `facts.d` path
- MUST be `*.ps1` or `*.json` files
- PowerShell scripts output raw hashtables, arrays, or primitive objects
- alongside other Ansible facts
- no INI (?!)

ENOINI ?

```
Subsets = 'local'
Code = {
    if (Test-Path -Path $factPath) {
        $factFiles = Get-ChildItem -Path $factpath | Where-Object {
            -not $_.PSIsContainer -and @('.ps1', '.json') -ccontains
$_.Extension
        }

        foreach ($factsFile in $factFiles) {
            $out = if ($factsFile.Extension -eq '.ps1') {
                & $($factsFile.FullName)
            }
            elseif ($factsFile.Extension -eq '.json') {
                Get-Content -Raw -Path $factsFile.FullName |
ConvertFrom-Json
            }
            if ($null -ne $out) {
                $ansibleFacts."ansible_$($factsFile.BaseName)" = $out
            }
        }
    }
```

ansible/windows/plugins/modules/setup.ps1

facts on **Windows**



Changing **fact_path**

```
- hosts: all
  gather_facts: true
  module_defaults:
     setup:
        fact_path: "{{ (os == 'win') |
             ternary('c:/facts', '/etc/ansible/facts.d') }}"
        fact_path: "{{ fpath }}"
  tasks:
  - debug:
       msg: "NLUUG = {{ ansible_facts['nluug'] |
             default(ansible_local['nluug']) }}"

  - set_fact:
       dinner: "{{ (os == 'win') |
             ternary(ansible_currybeer, ansible_local.hungry) }}"

  - debug:
       msg: "{{ dinner.dish }} for {{ dinner.meal }}"
```

Windows & Unix

```
TASK [debug] *******************************************************************
ok: [localhost] => {
    "msg": "NLUUG = {'voorjaarsconferentie': 'Utrecht', 'lunch': 'karnemelk'}"
}
ok: [win] => {
    "msg": "NLUUG = {'voorjaarsconferentie': 'Utrecht', 'lunch': 'karnemelk'}"
}

TASK [set_fact] ****************************************************************
ok: [localhost]
ok: [win]

TASK [debug] *******************************************************************
ok: [localhost] => {
    "msg": "rijsttafel for dinner"
}
ok: [win] => {
    "msg": "rijsttafel for dinner"
}
```

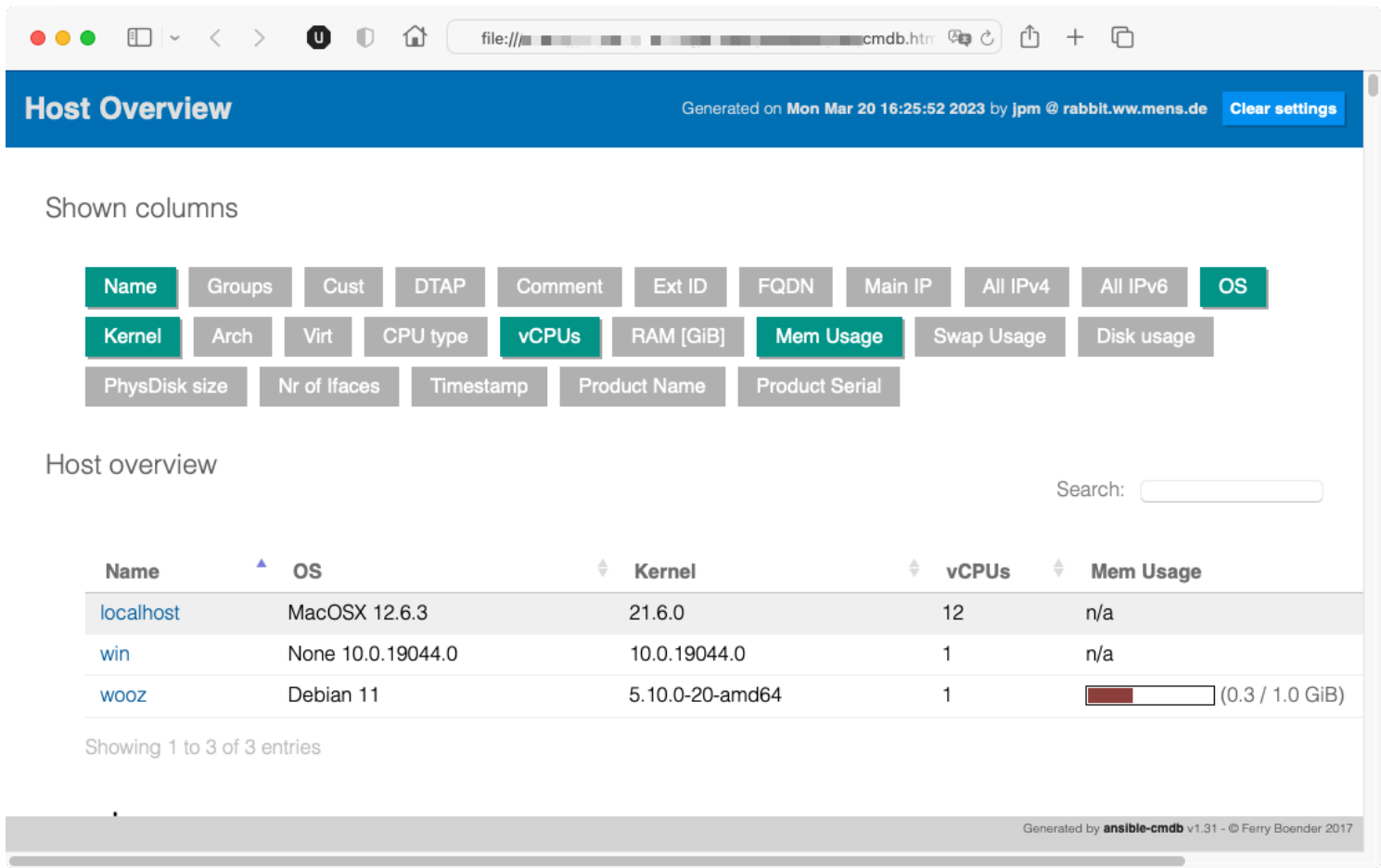
possible **solution**

Put all local facts in a `local.ps1` file on Windows

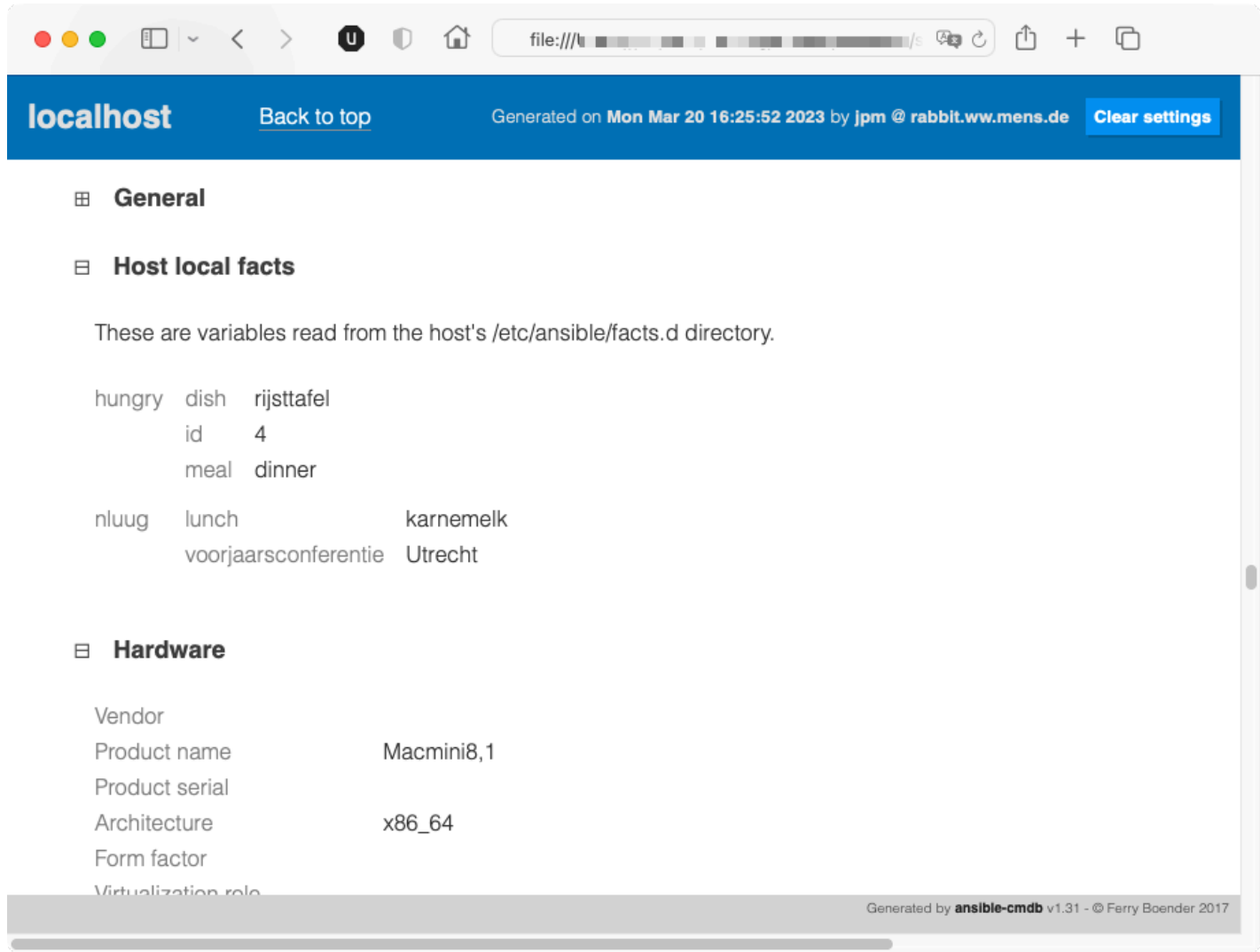
```
C:\facts > type local.ps1
@{
   hungry = & "C:/facts/hungry.exe" | ConvertFrom-Json
}

$ ansible win -m setup -a 'fact_path=c:/facts'

$ jq .ansible_local.hungry  /tmp/fcache/win
{
  "dish": "rijsttafel",
  "id": 4,
  "meal": "dinner"
}
```

ansible-**cmdb**

```
$ pip install ansible-cmdb
$ ansible all -m setup --tree o/
$ ansible-cmdb o/ > cmdb.html
```



ansible-**cmdb**



the **good** and the ugly

- Fact caching enabled per `ansible.cfg`
- Beware fact decay on high cache TTL
  e.g. `ansible_date_time`
- Incompatibilities Unix/Windows:
  missing `*.INI`, facts in different keys
- Feed Ansible facts to CMDB
- Wot? `"epoch":"1679577220,95027"`

aim for compatibility

- Use JSON fact files for Unix & Windows

```
- name: "Install JSON fact file"
  copy:
     content:
          forecast:
             day: Tuesday
             temperature: 17.3
     dest: "{{ weather_file }}"
```

- INI on Windows maybe with `Get-IniFile` via

  https://stackoverflow.com/questions/43690336/

that's a ~~fact~~ **wrap**

one last **cowch**

IKEA