

The Checkmk Ansible Collection

Automating your Monitoring Environment with the Checkmk Ansible Collection.



Lars Getwan

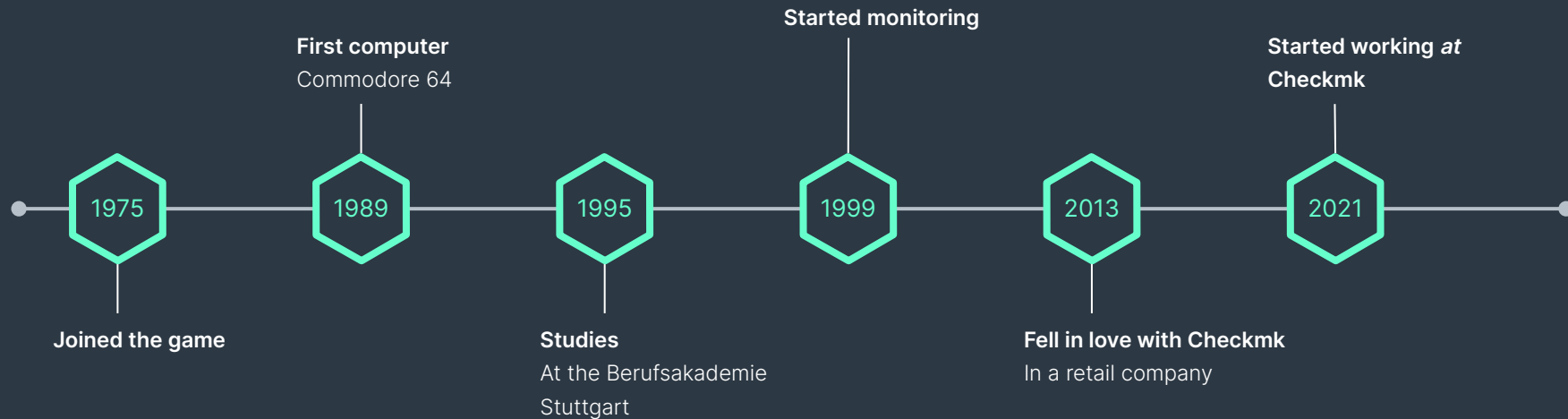
Consultant

Checkmk GmbH

checkmk.com

Who's talking?

Lars Getwan



Who's the audience?

Gym



Who is using Ansible?



Who is using a monitoring solution?



Who is using Checkmk already?

Agenda



01 What is Checkmk?

02 The Ansible Collection

03 Demo

04 The Code

05 Our Community

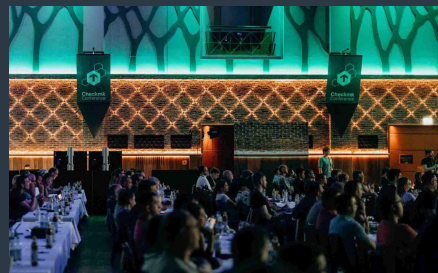






What is Checkmk?

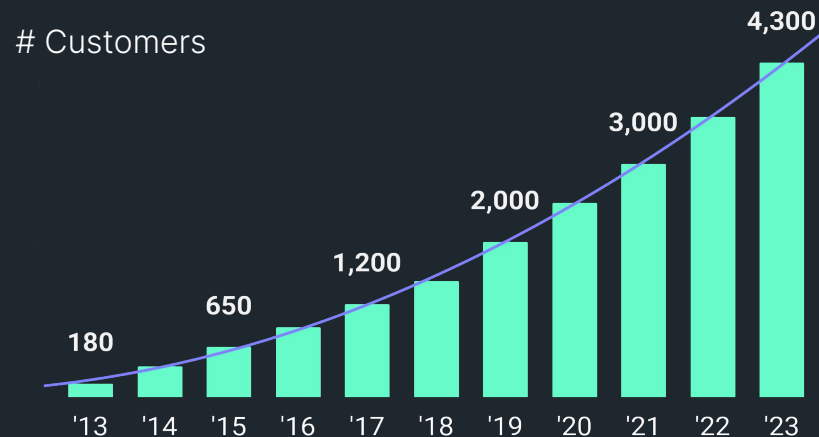
A brief introduction.



Checkmk – The Company

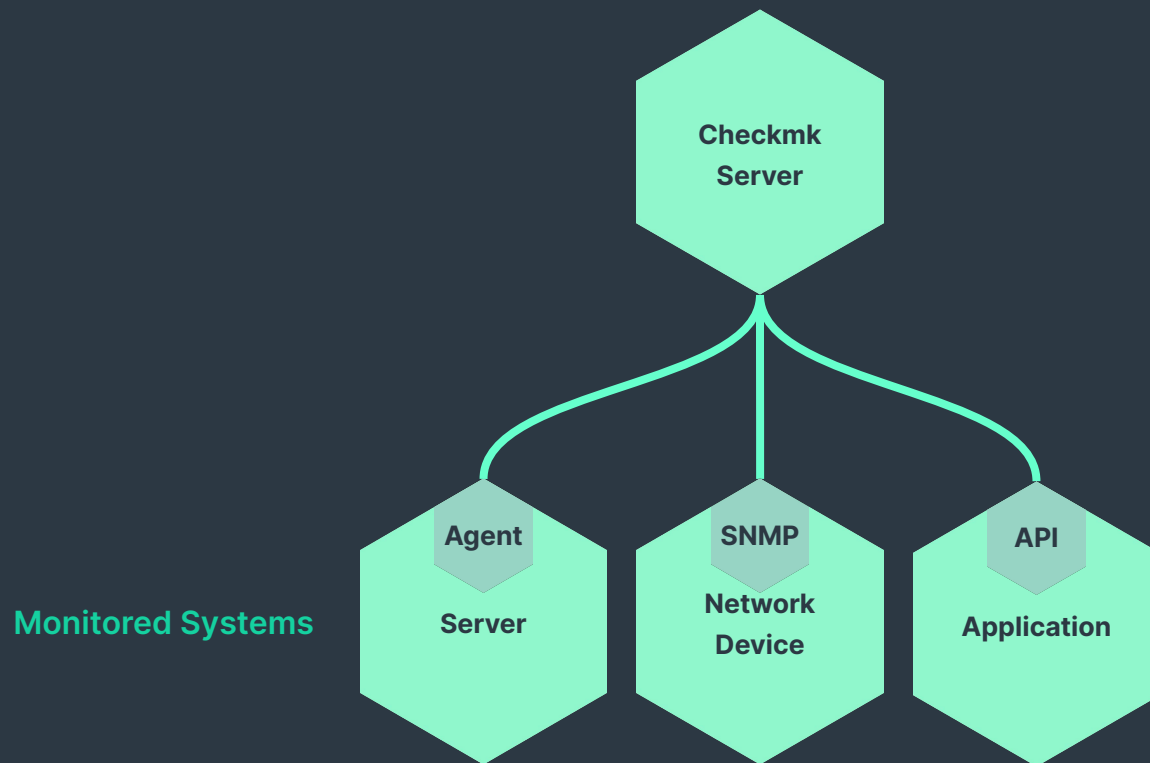


-  150+ employees, privately held, debt free
-  Based in Munich, Germany, and Atlanta, USA
-  Focusing on IT monitoring for 15+ years
-  Open-source enthusiasts



Checkmk – The Product

Architecture Overview



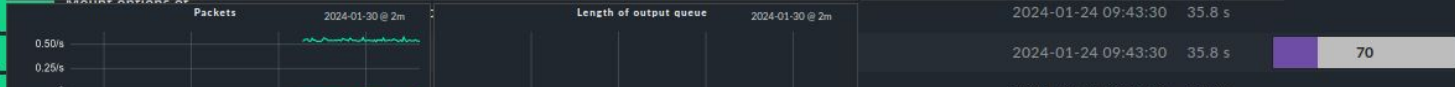
Commands Host Services Add to Export Display Help ^

Acknowledge problems Schedule downtimes Filter Show checkboxes ansuse

19 rows

ansuse

State	Service	Icons	Summary	Age	Checked	Perf-O-Meter
OK	Check_MK		[agent] Success, [piggyback] Success (but no data found for this host), execution time 0.4 sec	161 m	36.8 s	390 ms
OK	Check_MK Agent		Version: 2.2.0p19, OS: linux, Agent plugins: 0, Local checks: 0	2024-01-24 09:43:30	35.8 s	
OK	Check_MK Discovery		Services: all up to date, Host labels: all up to date	2024-01-24 09:34:17	38 m	
OK	CPU load		15 min load: 0.00, 15 min load per core: 0.00 (1 cores)	2024-01-24 09:43:30	35.8 s	0
OK	CPU utilization		Total CPU: 2.63%	2024-01-24 09:43:30	35.8 s	2.63%
OK	Disk IO SUMMARY		Read: 0.00 B/s, Write: 1.94 kB/s, Latency: 4 milliseconds	2024-01-24 09:44:30	35.8 s	0.00 B/s / 1.89 KiB/s
OK	Filesystem /		Used: 8.04% - 3.30 GiB of 41.0 GiB (warn/crit at 82.68%/91.34% used), trend per 1 day 0 hours: +614 B, trend per 1 day 0 hours: +<0.01%. Time left until disk full: 180630 years 10 days	2024-01-24 09:44:30	35.8 s	8.04%
OK	Filesystem /boot/efi		Used: 0.71% - 146 KiB of 19.9 MiB (warn/crit at 50.00%/60.00% used), trend per 1 day 0 hours: +0 B, trend per 1 day 0 hours: +0%	2024-01-24 09:44:30	35.8 s	0.71%
OK	Interface 2		[eth0], (up), MAC: 52:54:00:B9:3D:F9, Speed: unknown, In: 27.3 B/s, Out: 0.00 B/s	2024-01-24 09:43:30	35.8 s	219 bit/s / 0.00 bit/s



OK	ICMP Connections			2024-01-24 09:43:30	35.8 s	
OK	Uptime			2024-01-24 09:43:30	35.8 s	162 m

Hosts	5	Unhandled p.	0
Services	109	Unhandled p.	0
Events	0	Unhandled p.	0

Bookmarks ^

Master control v

This is how a particular host is monitored in Checkmk

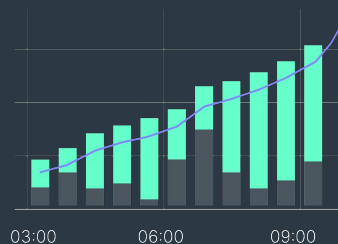
Built to address your needs



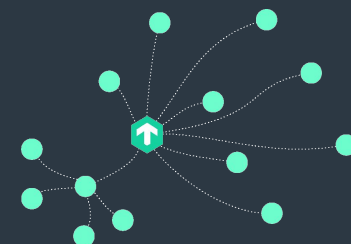
Monitor Everything



Highly Automated



Hyper-Scalable



Extensible

Extensible open-source monitoring



Build your own integrations
with simple scripts extending agents
or by writing entire plug-ins yourself

Extend existing integrations
to accommodate own requirements

- ◆ Majority of code base open source
- ◆ Easily readable and modifiable Python code
- ◆ Developer APIs for writing monitoring integrations
- ◆ Built-in logic to handle customized code
- ◆ Large partner ecosystem for customizations

The Checkmk Community

Where IT Monitoring experts meet



GitHub

>180 contributors



User forum

>6,000 users
>10,000 daily visits

Integration exchange

540+ packages



Translations

6 languages



REST-API



Automate your monitoring with the REST-API

- Automates configuration and operations
- Built on REST-API best-practice
- Provides auto-generated documentation with code examples

The screenshot shows the REST API documentation for the 'Create a host' endpoint. On the left is a navigation sidebar with a search bar and a list of menu items: Downtimes, Host status, Service status, SETUP, Agents, Activate changes, Business Intelligence (BI), Contact groups, Folders, Hosts, Show all hosts, Create a host (highlighted), Delete a host, Show a host, Update a host, Update the nodes of a cluster host, and Bulk update hosts. The main content area is titled 'Create a host' and includes the following sections:

- AUTHORIZATIONS:** (headerAuth) OR (webserverAuth) OR (cookieAuth)
- HEADER PARAMETERS:**
 - Content-Type** (required): string. Example: application/json. A header specifying which type of content is in the request/response body. This is required when sending encoded data in a POST/PUT body. When the request body is empty, this header should not be sent.
- REQUEST BODY SCHEMA:** application/json
 - folder** (required): string(?[!-\\W][?!-\\W[!-,a-zA-Z0-9]+)(0... Show pattern. The path name of the folder. Path delimiters can be either / or \\. Please use the one most appropriate for your quoting/escaping needs. A good default choice is /.
 - host_name** (required): string[0-9a-zA-Z_]+. The hostname or IP address of the host to be created.
 - attributes**: object. Attributes to set on the newly created host.
- Responses:**
 - 200 OK:** The operation was done successfully.
 - 400 Bad Request:** Parameter or validation failure.
 - 415 Unsupported Media Type:** The submitted content-type is not supported.

The screenshot shows the 'Request samples' and 'Response samples' sections of the REST API documentation. The 'Request samples' section is for a POST request to /domain-types/host_config/collectio... and shows a payload of application/json with the following JSON body:

```
{  "folder": "/",  "host_name": "example.com",  "attributes": {    "ipaddress": "192.168.0.123"  }}
```

The 'Response samples' section shows a 200 OK response with a content type of application/json and the following JSON body:

```
{  "links": [    + ( ... )  ],  "domainType": "string",  "id": "string",  "title": "string",  "members": [    + "property!": ( ... ),  ]}
```



@_workchronicles

workchronicles.com

You want to install your **first Checkmk server**, but the chapter in the **user's guide** is way to long.



The **Checkmk UI** is up and running, but how to add dozens of **Linux servers**?

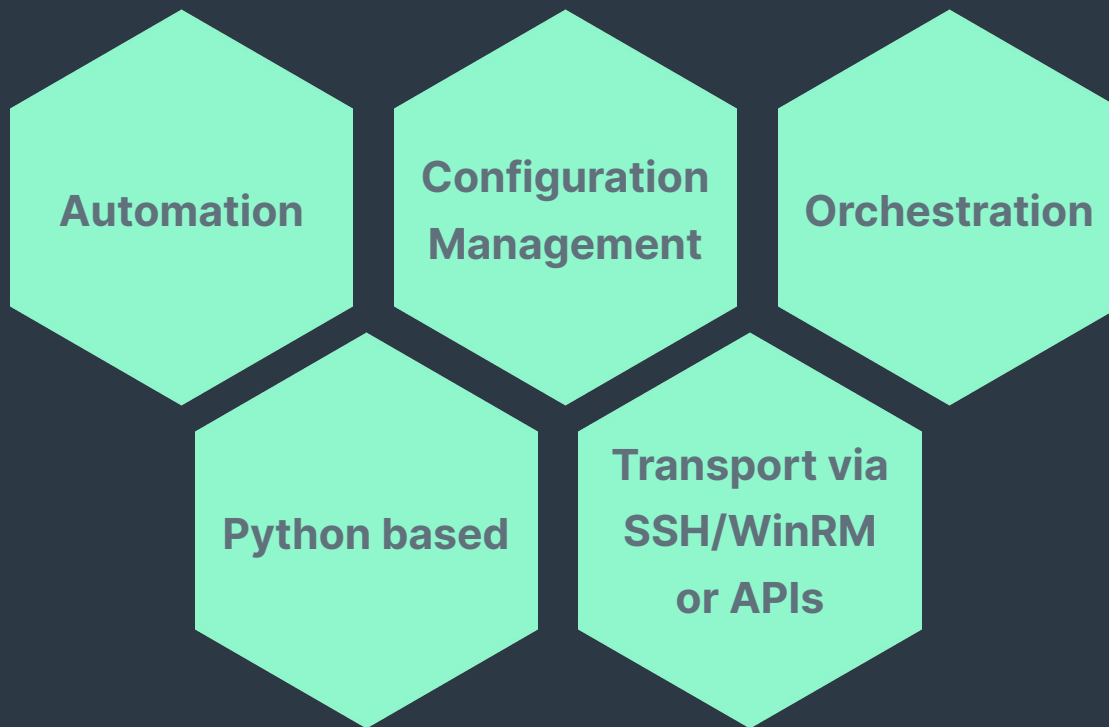




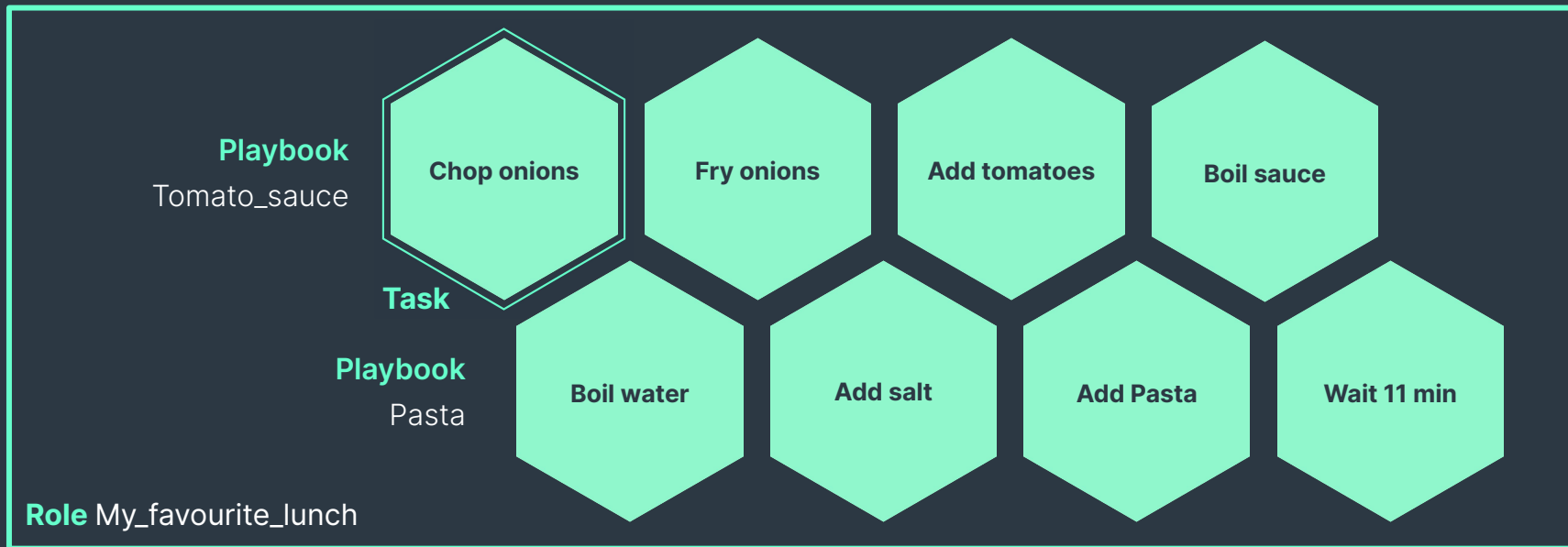
The Checkmk **Ansible Collection**

Automate your monitoring.

Ansible Overview



Ansible Components



Ansible Plugins



Operating Systems

- Linux
- Windows
- UNIX
- Solaris
- ...



Hardware

- Network
- Storage
- PDU
- ...



Cloud & Hypervisor

- VMware
- Proxmox
- oVirt
- AWS
- Azure
- GCP
- ...



Applications

- Netbox
- SAP
- MySQL
- Checkmk
- ...

Ansible Collections



Modular extensions to Ansible Core but independently developed.



Packaged for easy installation. Available on the Galaxy or GitHub.



Think of it as a library.



But why not using the REST API?

It's magic, but...

- ◆ Needs more code,
- ◆ Is hard to read and maintain,
- ◆ Provides no idempotency at all.

```
HOST_NAME="localhost"
PROTOCOL="https"
SITE_NAME="my_site"
USERNAME="automation"
PASSWORD="secret"

API_URL="$PROTOCOL://$HOST_NAME/$SITE_NAME/check_mk/api/1.0"

out=$(
  curl \
    --request POST \
    --write-out "\nxxx-status_code=%{http_code}\n" \
    --header "Authorization: Bearer $USERNAME $PASSWORD" \
    --header "Accept: application/json" \
    --header "Content-Type: application/json" \
    --data '{
      "name": "my_application_servers",
      "alias": "My Application Servers"
    }' \
    "$API_URL/domain-types/host_group_config/collections/all")

resp=$( echo "${out}" | grep -v "xxx-status_code" )
code=$( echo "${out}" | awk -F"=" '/^xxx-status_code/ {print $2}')

if [[ $code -lt 400 ]]; then
  echo "OK"
else
  echo "Request error"
fi
```

Why use an **Ansible Task** instead?



It's magic and...

- ◆ Needs less code,
- ◆ Is easier to read,
- ◆ Provides idempotency.

```
- name: "Create a single host group."
  checkmk.general.host_group:
    server_url: "http://localhost/"
    site: "my_site"
    automation_user: "automation"
    automation_secret: "secret"
    name: "my_application_servers"
    title: "My Application Servers"
    state: "present"
```

Checkmk Ansible Collection Contents



Playbooks

- Examples and inspiration
- Demonstration of collection features



Roles

- Server
 - Initial installation
 - Site management
 - Site updates
 - Supports all relevant Linux distros
- Agent
 - Initial installation
 - Registrations
 - Supports all relevant Linux distros and Windows



Modules

- Interact with Checkmk REST API
- Do specific actions in Checkmk, e.g.
 - create folder
 - retrieve list of hosts
- Full listing in the README

Demo

Popcorn time.





Demo Environment

Inventory

- ◆ Contains the hosts that you want to run Ansible playbooks for.
- ◆ Structures the hosts in groups.

```
[servers]
cmkserver

[agents]
cmkserver cmk_var_folder_path="/"
ansibuntu cmk_var_folder_path="/test"
debsible  cmk_var_folder_path="/foo"
anstream  cmk_var_folder_path="foo/bar"
ansuse    cmk_var_folder_path="/bar"
```

Demo Environment

Playbook 1/4

- ◆ Include the role `checkmk.general.server`
- ◆ Installs and configures a Checkmk server based on a set of parameters.

```
- name: "Set up Checkmk Servers."  
hosts: servers  
tasks:  
  - name: "Install Checkmk Server."  
    ansible.builtin.include_role:  
      name: checkmk.general.server
```



Demo Environment

Playbook 2/4

- ◆ Call the module `checkmk.general.folder`.
- ◆ Create folders for structuring the monitored hosts.

```
- name: "Create folders."
  checkmk.general.folder:
    server_url: "{{ cmk_url }}"
    site: "{{ checkmk_site }}"
    automation_user: "{{ cmk_user }}"
    automation_secret: "{{ cmk_pass }}"
    path: "{{ item.path }}"
    name: "{{ item.name }}"
    state: "present"
  loop: "{{ checkmk_folders }}"
  delegate_to: cmkserver
```



Demo Environment

Playbook 3/4

- ◆ Call the module `checkmk.general.rules`.
- ◆ Create rules to define how particular items should be monitored.

```
- name: "Create rules."
  checkmk.general.rule:
    server_url: "{{ cmk_url }}"
    site: "{{ checkmk_site }}"
    automation_user: "{{ cmk_user }}"
    automation_secret: "{{ cmk_pass }}"
    ruleset: "{{ item.ruleset }}"
    rule: "{{ item.rule }}"
    state: "present"
  loop: "{{ checkmk_rules }}"
  delegate_to: cmkserver
```



Demo Environment

Playbook 4/4

- ◆ Include the role `checkmk.general.agent`
- ◆ Installs Checkmk agents on the monitored hosts and adds them to the monitoring.

```
- name: "Set up Checkmk Agents."
  hosts: agents
  tasks:
    - name: "Install Checkmk Agent."
      ansible.builtin.include_role:
        name: checkmk.general.agent
```



Checkmk User Interface

What did the demo create?

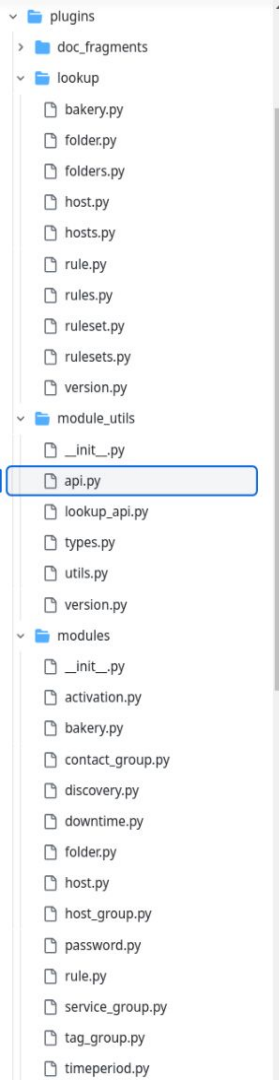
- http://192.168.124.60/cfgmgmtcamp/check_mk/



The Code

May the ~~force~~ **source** be with you.





```
26 < class CheckmkAPI:
27     """Base class to contact a Checkmk server"""
28
29 >     def __init__(self, module):
45         self.state = ""
46
47 <     def _fetch(self, code_mapping, endpoint="", data=None, method="GET"):
48         http_mapping = GENERIC_HTTP_CODES.copy()
49         http_mapping.update(code_mapping)
50
51         # retry if timed out and each time double the timeout value
52         num_of_retries = 3
53         timeout = 10
54         for i in range(num_of_retries):
55             response, info = fetch_url(
56                 module=self.module,
57                 url="%s/%s" % (self.url, endpoint),
58                 data=self.module.jsonify(data),
59                 headers=self.headers,
60                 method=method,
61                 use_proxy=None,
62                 timeout=timeout,
63             )
64
65             http_code = info["status"]
66
67             if http_code != -1:
68                 break
69
70             timeout *= 2
71
72         (
73             changed,
74             failed,
75             http_readable,
76         ) = http_mapping.get(http_code, (False, True, "Error calling API"))
77         # Better translate to json later and keep the original response here.
78         content = response.read() if response else ""
79         msg = "%s - %s" % (str(http_code), http_readable)
80         if failed:
81             details = info.get("body", info.get("msg", "N/A"))
82             msg += " Details: %s" % details
83
84         result = RESULT(
85             http_code=http_code,
86             msg=msg,
87             content=content,
88             etag=info.get("etag", ""),
89             failed=failed,
90             changed=changed,
91         )
92
93         if failed:
94             self.module.fail_json(**result_as_dict(result))
95         return result
96
```

CheckmkAPI Class
Handles communication with the REST API

- modules
 - __init__.py
 - activation.py
 - bakery.py
 - contact_group.py
 - discovery.py
 - downtime.py
 - folder.py
 - host.py
 - host_group.py
 - password.py
 - rule.py
 - service_group.py
 - tag_group.py
 - timeperiod.py
 - user.py
 - __init__.py
- roles
- scripts
- tests
 - .ansible-lint
 - .gitattributes
 - .gitignore
 - .yamllint
 - CHANGELOG.rst
 - CODEOWNERS
 - CODE_OF_CONDUCT.md
 - COMMUNITY.md
 - CONTRIBUTING.md
 - LICENSE
 - Makefile
 - README.md
 - SECURITY.md
 - SUPPORT.md

```

10 > DOCUMENTATION = r"""
71 ###
72
73 > EXAMPLES = r"""
134 ###
135
136 > RETURN = r"""
142 ###
143
144 import json
145 import sys
146 import traceback
147
148 # https://docs.ansible.com/ansible/latest/dev_guide/testing/sanity/import.html
149 from ansible.module_utils.basic import AnsibleModule, missing_required_lib
150 from ansible.module_utils.common.dict_transformations import dict_merge
151 from ansible_collections.checkmk.general.plugins.module_utils.api import CheckmkAPI
152 from ansible_collections.checkmk.general.plugins.module_utils.types import RESULT
153 from ansible_collections.checkmk.general.plugins.module_utils.utils import (
154     result_as_dict,
155 )
156 from ansible_collections.checkmk.general.plugins.module_utils.version import (
157     CheckmkVersion,
158 )
159
160 PYTHON_VERSION = 3
161 HAS_PATHLIB2_LIBRARY = True
162 PATHLIB2_LIBRARY_IMPORT_ERROR = None
163
164 if sys.version[0] == "3":
165     from pathlib import Path
166 else:
167     PYTHON_VERSION = 2
168     try:
169         from pathlib2 import Path
170     except ImportError:
171         HAS_PATHLIB2_LIBRARY = False
172         PATHLIB2_LIBRARY_IMPORT_ERROR = traceback.format_exc()
173
174 > FOLDER = (
179 ###
180
181
182 < class FolderHTTPCodes:
183     # http_code: (changed, failed, "Message")
184     get = {
185         200: (False, False, "Folder found, nothing changed"),
186         404: (False, False, "Folder not found"),
187     }
188
189     create = {200: (True, False, "Folder created")}
190     edit = {200: (True, False, "Folder modified")}
191     delete = {204: (True, False, "Folder deleted")}
192

```

Folder Module (1/3)

Documentation, imports and helper classes

- modules
 - __init__.py
 - activation.py
 - bakery.py
 - contact_group.py
 - discovery.py
 - downtime.py
 - folder.py
 - host.py
 - host_group.py
 - password.py
 - rule.py
 - service_group.py
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```

399 # define available arguments/parameters a user can pass to the module
400
401 module_args = dict(
402     server_url=dict(type="str", required=True),
403     site=dict(type="str", required=True),
404     validate_certs=dict(type="bool", required=False, default=True),
405     automation_user=dict(type="str", required=True),
406     automation_secret=dict(type="str", required=True, no_log=True),
407     path=dict(type="str", required=True),
408     name=dict(
409         type="str",
410         required=False,
411         aliases=["title"],
412     ),
413     attributes=dict(type="raw", required=False),
414     remove_attributes=dict(type="raw", required=False),
415     update_attributes=dict(type="raw", required=False),
416     state=dict(
417         type="str", required=False, default="present", choices=["present", "absent"]
418     ),
419 )
420
421 module = AnsibleModule(argument_spec=module_args, supports_check_mode=True)
422
423 _exit_if_missing_pathlib(module)
424
425 # Create an API object that contains the current and desired state
426 current_folder = FolderAPI(module)
427
428 result = RESULT(
429     http_code=0,
430     msg="No changes needed.",
431     content="",
432     etag="",
433     failed=False,
434     changed=False,
435 )
436
437 desired_state = current_folder.params.get("state")
438 if current_folder.state == "present":
439     result = result._replace(
440         msg="Folder already exists with the desired parameters."
441     )
442 if desired_state == "absent":
443     result = current_folder.delete()
444 elif current_folder.needs_update():
445     result = current_folder.edit()
446 elif current_folder.state == "absent":
447     result = result._replace(msg="Folder already absent.")
448 if desired_state in ("present"):
449     result = current_folder.create()
450
451 module.exit_json(**result_as_dict(result))
452

```

Folder Module (2/3)

run_module function called by Ansible

- modules
- __init__.py
- activation.py
- bakery.py
- contact_group.py
- discovery.py
- downtime.py
- folder.py
- host.py
- host_group.py
- password.py
- rule.py
- service_group.py
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```

199 class FolderAPI(CheckmkAPI):
200     def __init__(self, module):
201         super().__init__(module)
202
203         self.desired = {}
204
205         (self.desired["parent"], self.desired["name"]) = self._normalize_path(
206             self.params.get("path")
207         )
208         self.desired["title"] = self.params.get("title", self.desired["name"])
209
210         for key in FOLDER:
211             if self.params.get(key):
212                 self.desired[key] = self.params.get(key)
213
214         # Get the current folder from the API and set some parameters
215         self._get_current()
216         self._changed_items = self._detect_changes()
217
218         self._verify_compatibility()
219
220 > def _verify_compatibility(self):
250     self.module.warn(msg)
251
252 > def _normalize_path(self, path):
256     return str(p.parent).lower(), p.name
257
258     def _urlize_path(self, path):
259         return path.replace("/", "~").replace("~", "-")
260
261 > def _build_default_endpoint(self):
265     )
266
267 > def _detect_changes(self):
295     return changes
296
297 > def _get_current(self):
320     self.state = "absent"
321
322 > def _check_output(self, mode):
330     )
331
332     def needs_update(self):
333         return len(self._changed_items) > 0
334
335 > def create(self):
353     return result
354
355 > def edit(self):
373     )
374
375 > def delete(self):
385     return result
386
387

```

Folder Module (3/3)

FolderAPI class defines how to create/update/delete a folder

```
267 ✓ def _detect_changes(self):
268     current_attributes = self.current.get("attributes", {})
269     desired_attributes = self.desired.copy()
270     changes = []
271
272     if desired_attributes.get("update_attributes"):
273         merged_attributes = dict_merge(
274             current_attributes, desired_attributes.get("update_attributes")
275         )
276
277         if merged_attributes != current_attributes:
278             desired_attributes["update_attributes"] = merged_attributes
279             changes.append("update attributes")
280
281     if desired_attributes.get(
282         "attributes"
283     ) and current_attributes != desired_attributes.get("attributes"):
284         changes.append("attributes")
285
286     if self.current.get("title") != desired_attributes.get("title"):
287         changes.append("title")
288
289     if desired_attributes.get("remove_attributes"):
290         for a in desired_attributes.get("remove_attributes"):
291             if current_attributes.get(a):
292                 changes.append("remove attributes")
293                 break
294
295     return changes
```

Folder Module Challenges (1/2)

Detect the differences between desired and current parameters

```

220 ✓ def _verify_compatibility(self):
221     # Check if parameters are compatible with CMK version
222     if (
223         sum(
224             [
225                 1
226                 for el in ["attributes", "remove_attributes", "update_attributes"]
227                 if self.module.params.get(el)
228             ]
229         )
230         > 1
231     ):
232
233         ver = self.getversion()
234         msg = (
235             "As of Check MK v2.2.0p7 and v2.3.0b1, simultaneous use of"
236             " attributes, remove_attributes, and update_attributes is no longer supported."
237         )
238
239         if ver >= CheckmkVersion("2.2.0p7"):
240             result = RESULT(
241                 http_code=0,
242                 msg=msg,
243                 content="",
244                 etag="",
245                 failed=True,
246                 changed=False,
247             )
248             self.module.exit_json(**result_as_dict(result))
249         else:
250             self.module.warn(msg)
251

```

Folder Module Challenges (2/2)

REST API behavior sometimes depends on the Checkmk version



Our Community

With a little lot of help from our friends.



Statistics

Because nerds love stats.



48+

Releases

23+

Contributors

86+

GitHub Stars

3800+

Commits

Our Intention

Why did we start this community project?



Collect & Unify



Simplify



Save time

To boldly go...

What is our vision for this community project?



Empowerment



Coverage



Guidance

The pioneers



The pioneers



Please **do** try this at home!





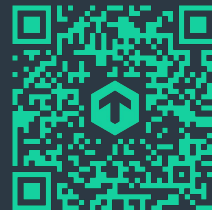
Resources

What's where?

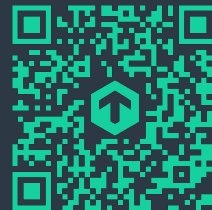
- ◆ Ansible Collection Repository:
<https://checkmk.io/collection-repo>



- ◆ Ansible Galaxy:
<https://checkmk.io/ansible-galaxy>



- ◆ Forum:
<https://checkmk.io/forum-ansible>



Thank you!

Vielen Dank!



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