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Ansible für Devs – Konfigurationsmanagement nicht nur für Ops

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Zur meiner Person

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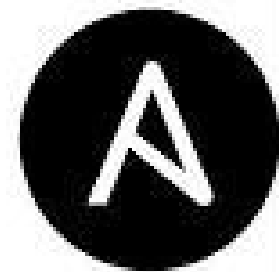
Agenda

1. Ansible – Was ist das?
2. Warum ist es für Entwickler interessant?
3. Einführung in Ansible
4. Wie unterscheidet sich Ansible zur seiner Konkurrenz?
5. Weitere Einsatzszenarien aus Entwicklersicht

Ansible
Was ist das?

Ansible

- Software für
 - Konfigurationsmanagement,
 - Softwareverteilung und
 - Ad-hoc-Kommando-Ausführung



Konfigurationsmanagement (KM)

„Das KM umfasst alle technischen, organisatorischen und beschlussfassenden Maßnahmen und Strukturen, die sich mit der Konfiguration (Spezifikation) eines Produkts befassen.“

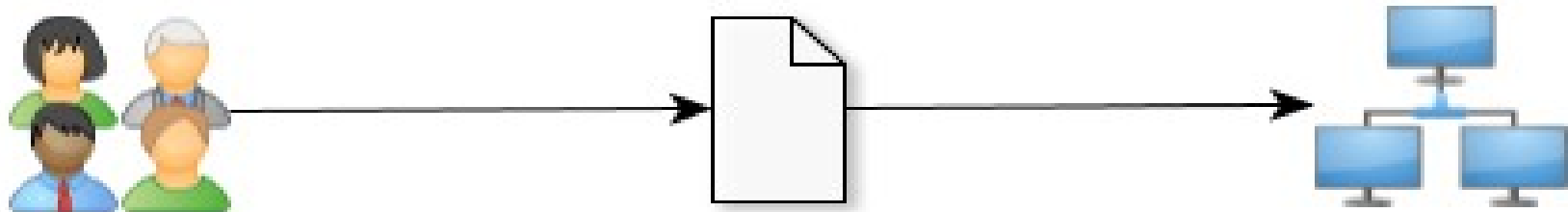
<https://www.projektmagazin.de/glossarterm/konfigurationsmanagement>

Konfigurationsmanagement (KM)

- Softwarekonfiguration
- Hardwarekonfiguration
- Dienstleistungskonfiguration
- Systemkonfiguration

Systemkonfiguration

- „Infrastructure As Code“



Systemkonfiguration

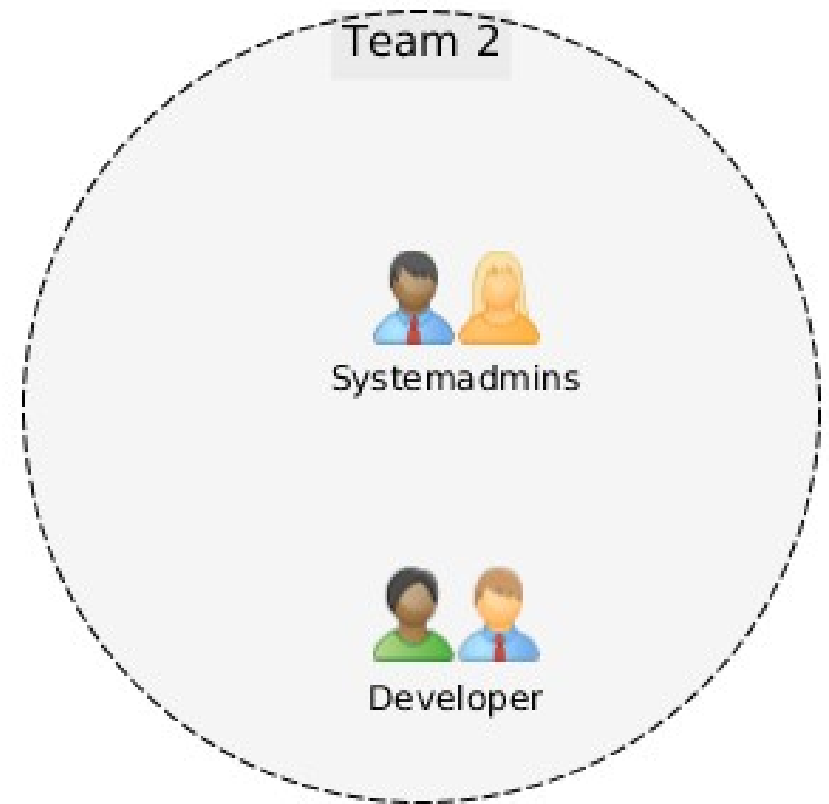
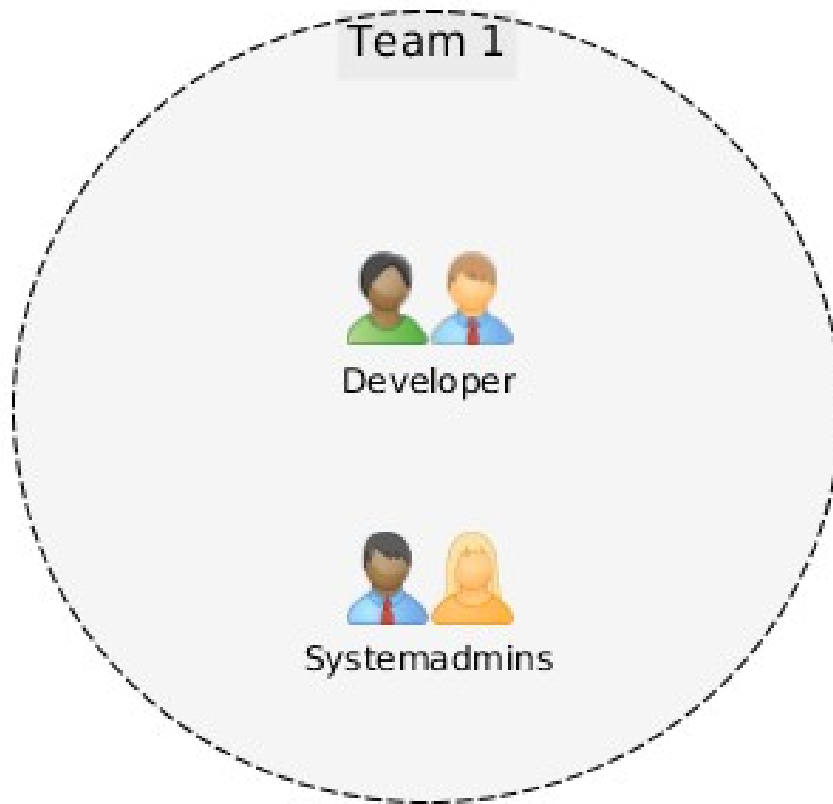
- „Infrastructure As Code“



Warum ist es für Entwickler
interessant?

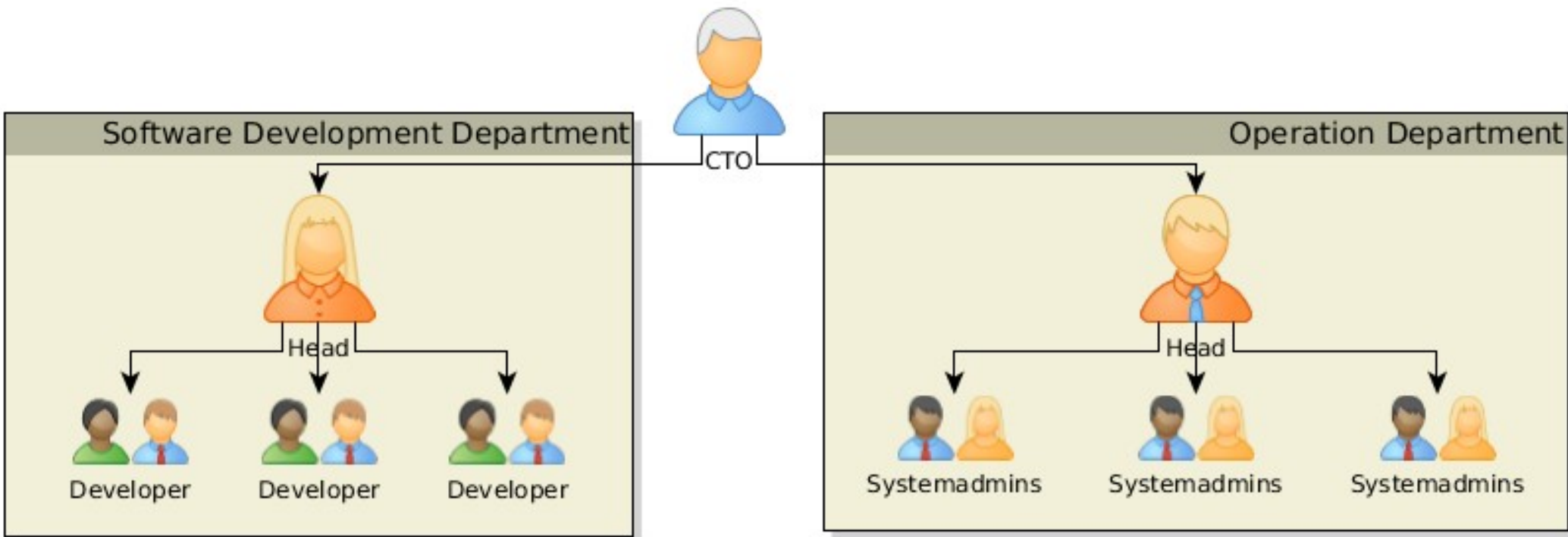
Systemkonfiguration für Entwickler

Organisatorische Ausgangslage
Wunsch



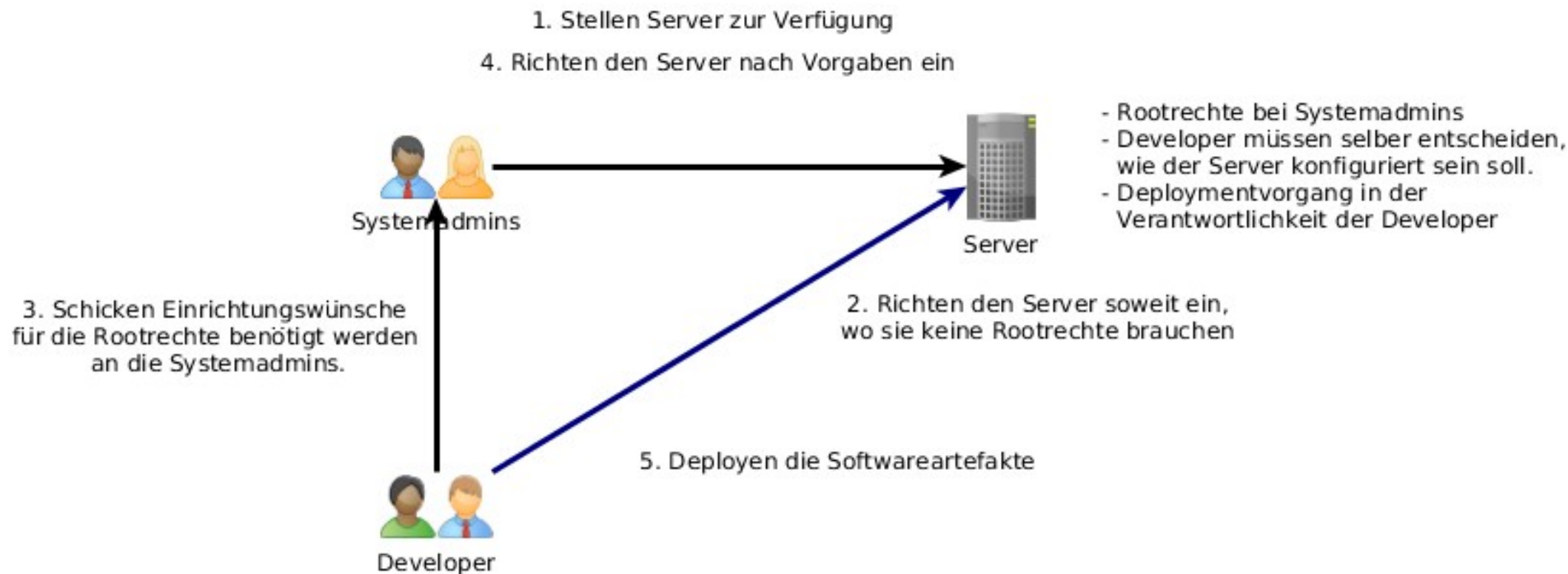
Systemkonfiguration für Entwickler

Organisatorische Ausgangslage
Realität



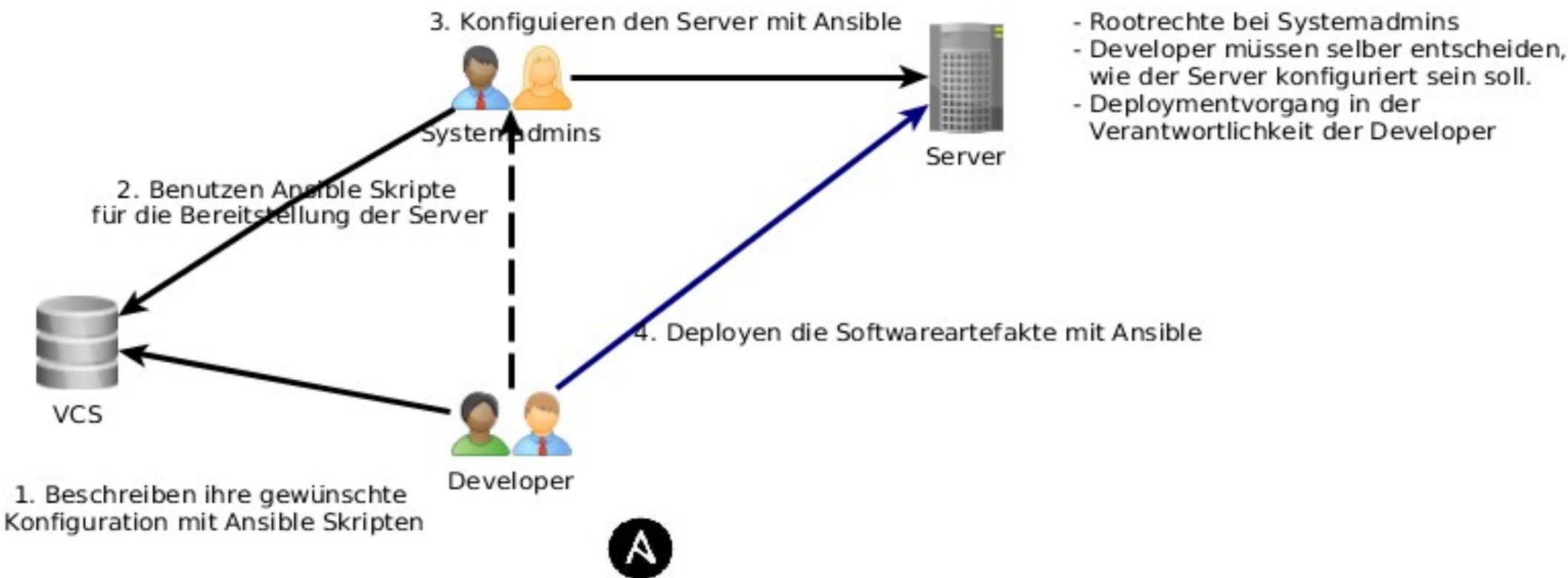
Systemkonfiguration für Entwickler

Prozess zwischen Development und Operation



Systemkonfiguration für Entwickler

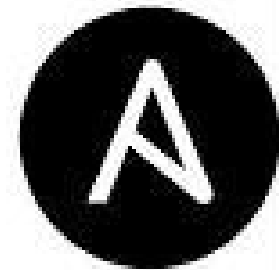
Lösungsidee mit Ansible



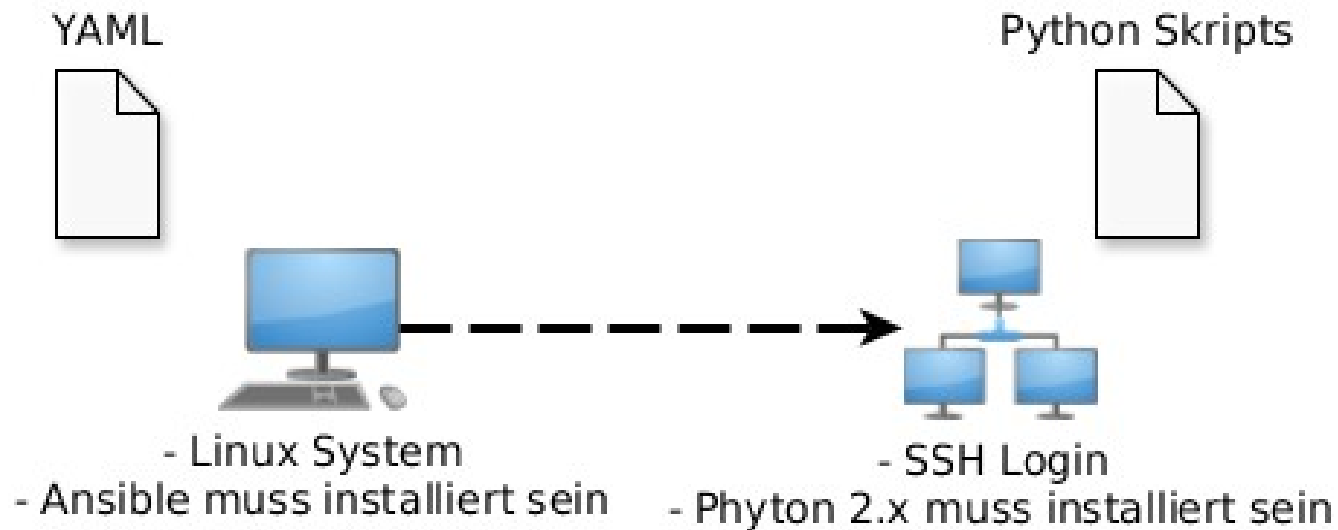
Einführung in Ansible

Ansible

- Software für
 - Konfigurationsmanagement,
 - Softwareverteilung und
 - Ad-hoc-Kommando-Ausführung
- Sprache: Python
- Ansible Skripte: YAML



Funktionsweise



Exkurs: YAML

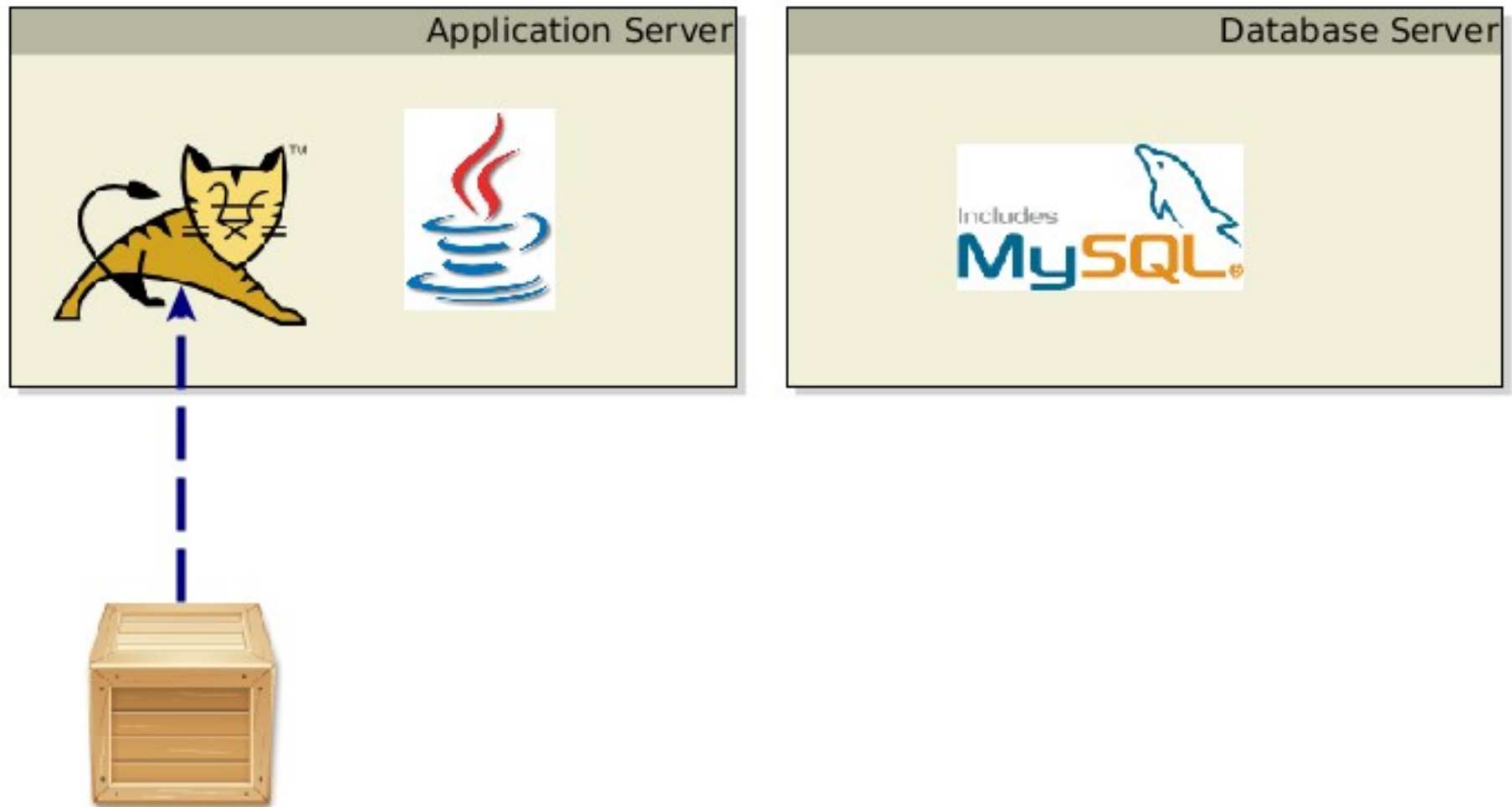
YAML

```
---
foo: "bar"
baz:
  - "qux"
  - "quxx"
corge: null
grault: 1
garply: true
waldo: "false"
fred: "undefined"
emptyArray: []
emptyObject: {}
emptyString: ""
```

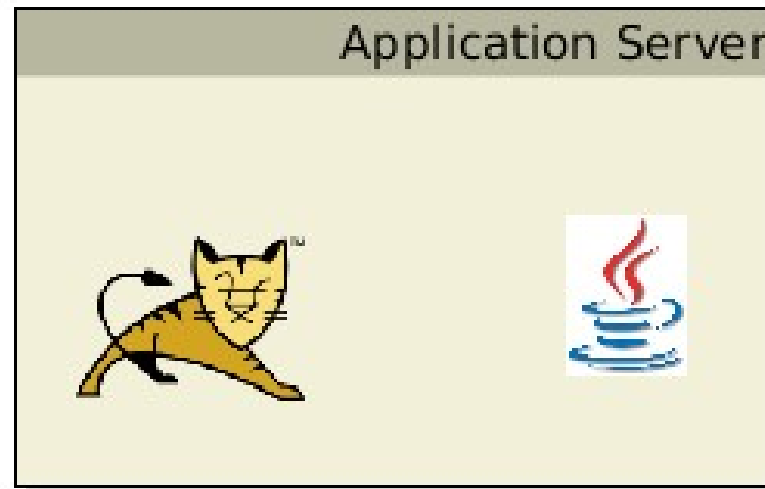
JSON

```
{
  "foo": "bar",
  "baz": [
    "qux",
    "quxx"
  ],
  "corge": null,
  "grault": 1,
  "garply": true,
  "waldo": "false",
  "fred": "undefined",
  "emptyArray": [],
  "emptyObject": {},
  "emptyString": ""
}
```

Ansible Beispiel



Setup Application Server Playbook



```
1 - hosts: application-server
2   vars:
3     tomcat_version: 8.5.8
4     tomcat_base_name: apache-tomcat-{{ tomcat_version }}
5     #catalina_opts: "-Dkey=value"
6
7   tasks:
8     - name: install java
9       apt: name=openjdk-8-jdk state=present
10      become: yes
11      become_method: sudo
12
13     - name: Download current Tomcat 8 version
14       local_action: get_url url="http://archive.apache.org/dist/tomcat/tomcat-8/v{{
15 tomcat_version }}/bin/{{ tomcat_base_name }}.tar.gz" dest=/tmp
16
17     - name:
18       file: name=/opt mode=777
19       become: yes
20       become_method: sudo
21
22     - name: Install Tomcat 8
23       unarchive: src=/tmp/{{ tomcat_base_name }}.tar.gz dest=/opt creates=/opt/{{
24 tomcat_base_name }} owner=vagrant group=vagrant
25
26     - name: Set link to tomcat 8
27       file: src=/opt/{{ tomcat_base_name }} dest=/opt/tomcat state=link force=yes
28
29     - name: setup setenv.sh
30       template: dest="/opt/{{ tomcat_base_name }}/bin/setenv.sh"
31       src="roles/tomcat8/templates/setenv.sh.j2" mode=755
32       when: catalina_opts is defined
33
34     - find: paths="/opt/{{ tomcat_base_name }}/bin" patterns="*.sh"
35       register: result
36
37     - name: ensure tomcat scripts are executable
38       file: name={{item.path}} mode=755
```

Inventories

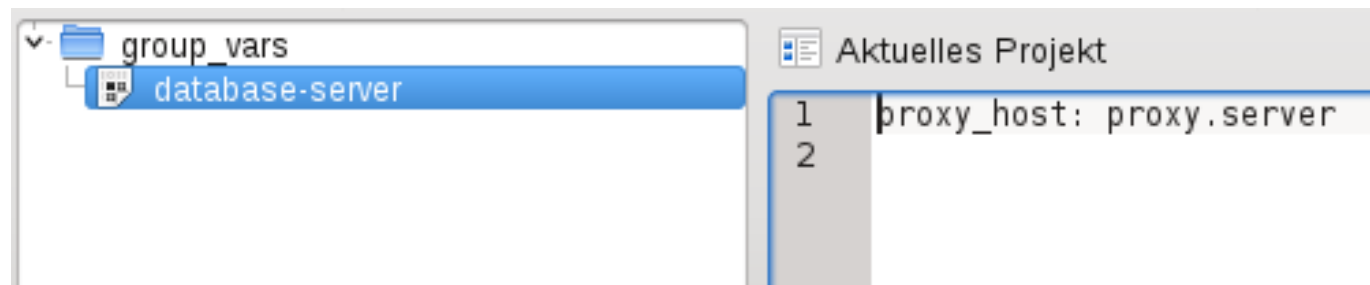
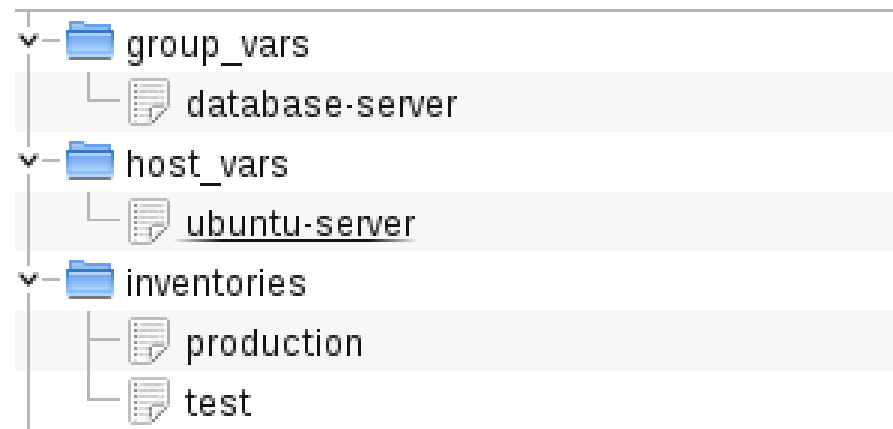
Production

```
1 [application-server]
2 192.168.33.10
3 ubuntu-server db_host=mysql01
4
5 [mysql-db-server]
6 mysql[01:10]
7
8 [oracle-db-server]
9 db-[a:f].oracle.company.com
10
11 [database-server:children]
12 mysql-db-server
13 oracle-db-server
14 |
15 [application-server:vars]
16 message="Welcome"
17
18 [database-server:vars]
19 message="Hello World!"
```

Test

```
1 [application-server]
2 192.168.33.10
3
4 [database-server]
5 192.168.33.10
6
```

Inventories



```
9 apt: name=openjdk-8-jdk state=present
10 become: yes
11 become_method: sudo
12
13 - name: Download current Tomcat 8 version
14   local_action: get_url url="http://archive.apache.org/dist/tomcat/tomcat-8/v{{
15 tomcat_version }}/bin/{{ tomcat_base_name }}.tar.gz" dest=/tmp
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30   template: dest="/opt/{{ tomcat_base_name }}/bin/setenv.sh"
31   src="roles/tomcat8/templates/setenv.sh.j2" mode=755
32   when: catalina_opts is defined
33
34 - find: paths="/opt/{{ tomcat_base_name }}/bin" patterns="*.sh"
35   register: result
36
37 - name: ensure tomcat scripts are executable
38   file: name={{item.path}} mode=755
39   with_items: '{{ result.files }}'
40
41 - name: install init.d script for tomcat
42   copy: src=roles/tomcat8/files/init.d/tomcat dest=/etc/init.d/tomcat owner=vagrant
43   group=vagrant mode=755
44   become: yes
45   become_method: sudo
```


Templates

- setenv.sh.j2

```
1 CATALINA_OPTS="{{ catalina_opts }}"
```

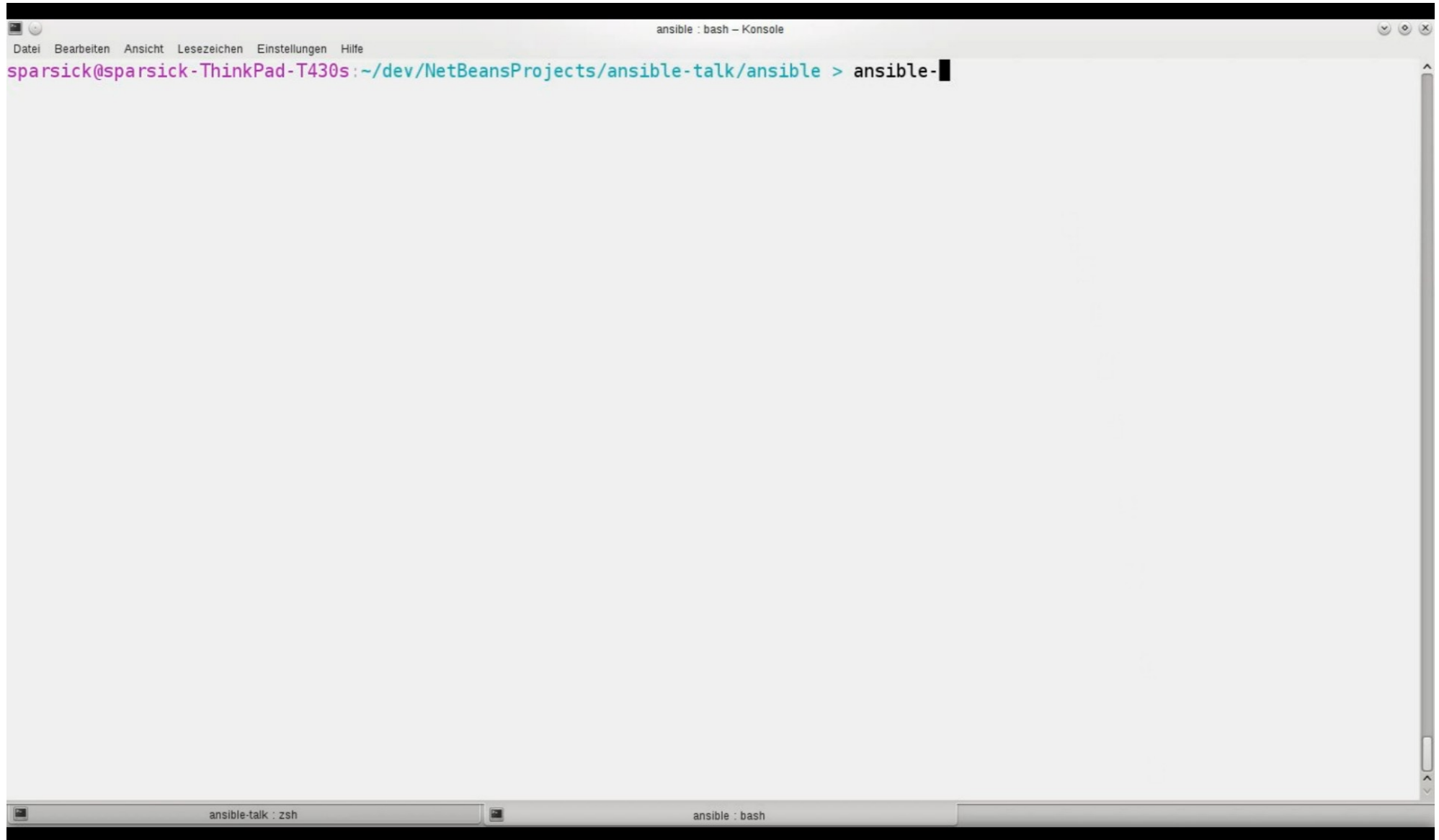
Templates - Jinja2

- Templating engine für Python

```
<title>{% block title %}{% endblock %}</title>
<ul>
  {% for user in users %}
    <li><a href="{{ user.url }}">{{ user.username }}</a></li>
  {% endfor %}
</ul>
```

- Mehr Information unter
<http://jinja.pocoo.org/docs/dev/>

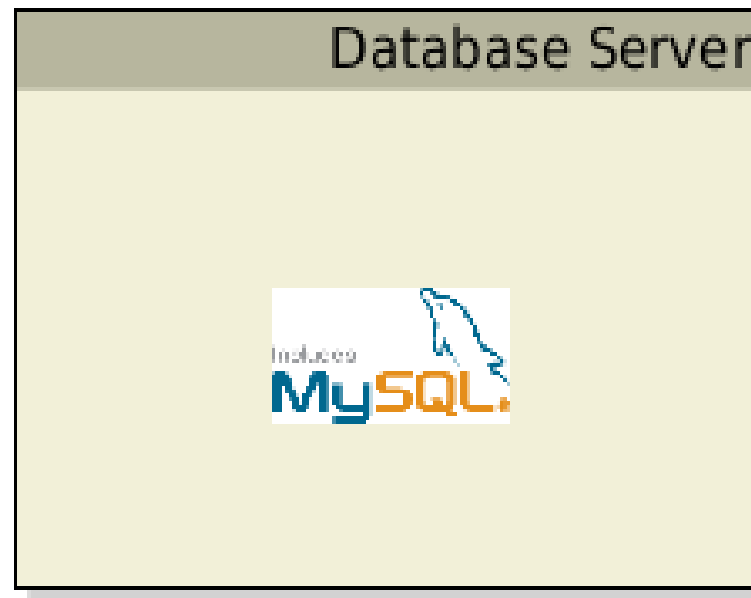
Setup Application Server Playbook



The image shows a terminal window titled "ansible : bash – Konsole". The window has a menu bar with "Datei", "Bearbeiten", "Ansicht", "Lesezeichen", "Einstellungen", and "Hilfe". The prompt is "sparsick@sparsick-ThinkPad-T430s:~/dev/NetBeansProjects/ansible-talk/ansible >". The user has entered "ansible-" and the cursor is at the end of the line. The terminal is mostly empty, with a vertical scrollbar on the right side. At the bottom, there are two tabs: "ansible-talk : zsh" and "ansible : bash".

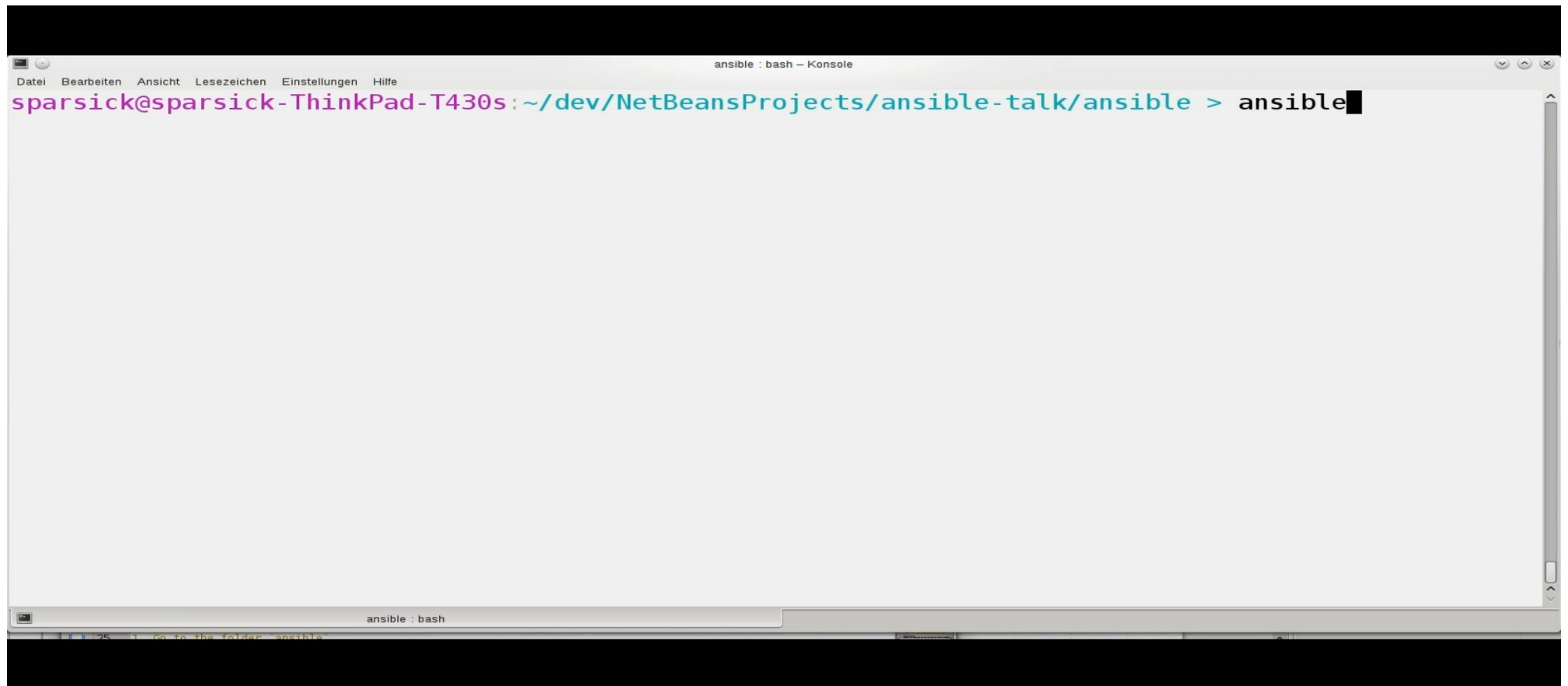
```
ansible : bash – Konsole
Datei Bearbeiten Ansicht Lesezeichen Einstellungen Hilfe
sparsick@sparsick-ThinkPad-T430s:~/dev/NetBeansProjects/ansible-talk/ansible > ansible-
ansible-talk : zsh
ansible : bash
```

Setup Database Server Playbook



```
1 - hosts: database-server
2   become: yes
3   become_method: sudo
4
5   tasks:
6     - name: install mysql db
7       apt: name=mysql-server state=present
8
9     - name: installs python-mysqldb
10      apt: name=python-mysqldb state=present
11
12     - name: start mysql
13       service: name=mysql state=started
14
15     - name: set bind address
16       lineinfile: dest=/etc/mysql/mysql.conf.d/mysqld.cnf
17         line='bind-address = 0.0.0.0'
18         state=present
19         regexp=^bind-address(.*)
20       notify: restart mysql
21
22     - name: creates db user dba
23       mysql_user: name=dba password=g3h3lm priv=*.*:ALL,GRANT state=present host=%
24
25   handlers:
26     - name: restart mysql
27       service: name=mysql state=restarted
```

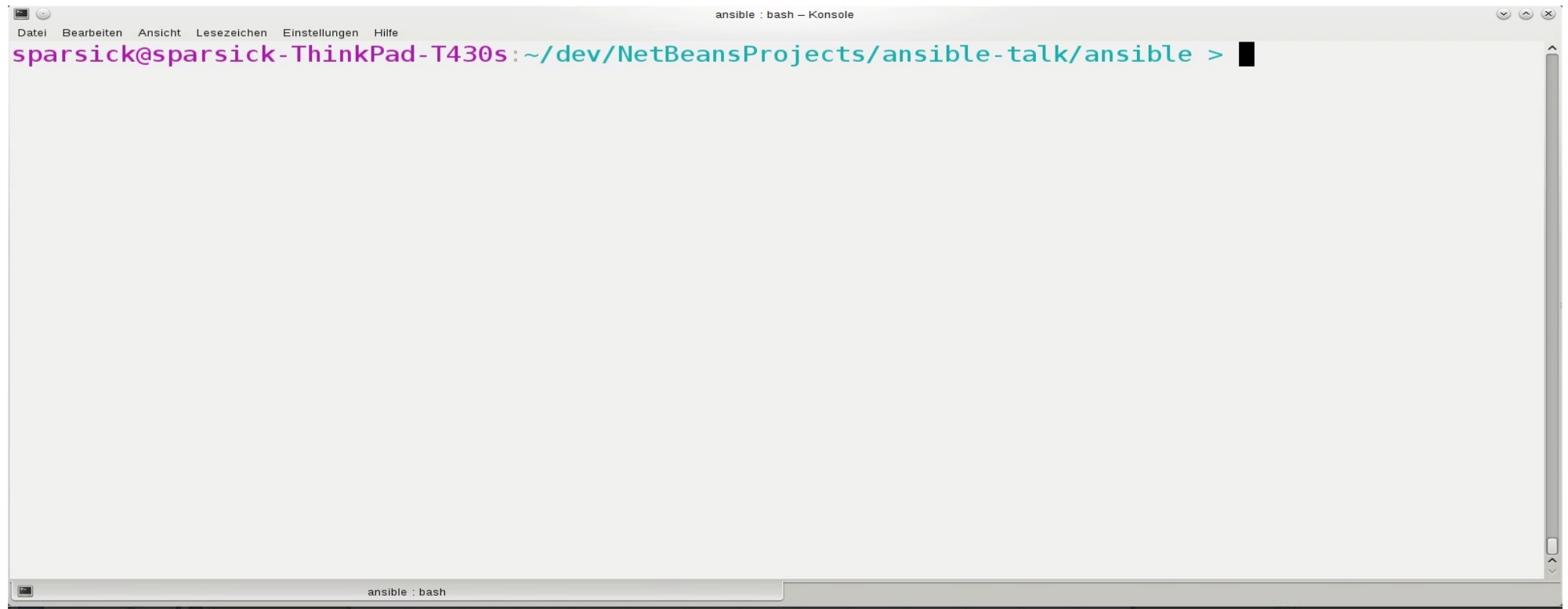
Setup Database Server Playbook



The image shows a screenshot of a terminal window within the NetBeans IDE. The window title is "ansible : bash - Konsole". The menu bar includes "Datei", "Bearbeiten", "Ansicht", "Lesezeichen", "Einstellungen", and "Hilfe". The terminal prompt is "sparsick@sparsick-ThinkPad-T430s: ~/dev/NetBeansProjects/ansible-talk/ansible >". The command "ansible" has been entered, and a black cursor is visible at the end of the word. The terminal output area is empty. At the bottom of the IDE, a snippet of a code editor is visible, showing the text "25 # go to the folder 'ansible'".

```
ansible : bash - Konsole
Datei Bearbeiten Ansicht Lesezeichen Einstellungen Hilfe
sparsick@sparsick-ThinkPad-T430s: ~/dev/NetBeansProjects/ansible-talk/ansible > ansible
ansible : bash
25 # go to the folder 'ansible'
```

Setup Database Server Playbook



A screenshot of a terminal window within a NetBeans IDE. The window title is "ansible : bash – Konsole". The menu bar includes "Datei", "Bearbeiten", "Ansicht", "Lesezeichen", "Einstellungen", and "Hilfe". The terminal text shows the user "sparsick" on a "sparsick-ThinkPad-T430s" machine, with the current directory set to "~/dev/NetBeansProjects/ansible-talk/ansible". The prompt is a green ">" followed by a black cursor. The status bar at the bottom indicates "ansible : bash".

```
ansible : bash – Konsole
Datei Bearbeiten Ansicht Lesezeichen Einstellungen Hilfe
sparsick@sparsick-ThinkPad-T430s: ~/dev/NetBeansProjects/ansible-talk/ansible > 
```

```
1 - hosts: application-server
2   vars:
3     tomcat_version: 8.5.8
4     tomcat_base_name: apache-tomcat-{{ tomcat_version }}
5     #catalina_opts: "-Dkey=value"
6
7   tasks:
8     - name: install java
9       apt: name=openjdk-8-jdk state=present
10      become: yes
11      become_method: sudo
12
13     - name: Download current Tomcat 8 version
14       local_action: get_url url="http://archive.apache.org/dist/tomcat/tomcat-8/v{{
15 tomcat_version }}/bin/{{ tomcat_base_name }}.tar.gz" dest=/tmp
16
17     - name:
18       file: name=/opt mode=777
19       become: yes
20       become_method: sudo
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22     - name: Install Tomcat 8
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24 tomcat_base_name }} owner=vagrant group=vagrant
25
26     - name: Set link to tomcat 8
27       file: src=/opt/{{ tomcat_base_name }} dest=/opt/tomcat state=link force=yes
28
29     - name: setup setenv.sh
30       template: dest="/opt/{{ tomcat_base_name }}/bin/setenv.sh"
31       src="roles/tomcat8/templates/setenv.sh.j2" mode=755
32       when: catalina_opts is defined
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34     - find: paths="/opt/{{ tomcat_base_name }}/bin" patterns="*.sh"
35       register: result
36
37     - name: ensure tomcat scripts are executable
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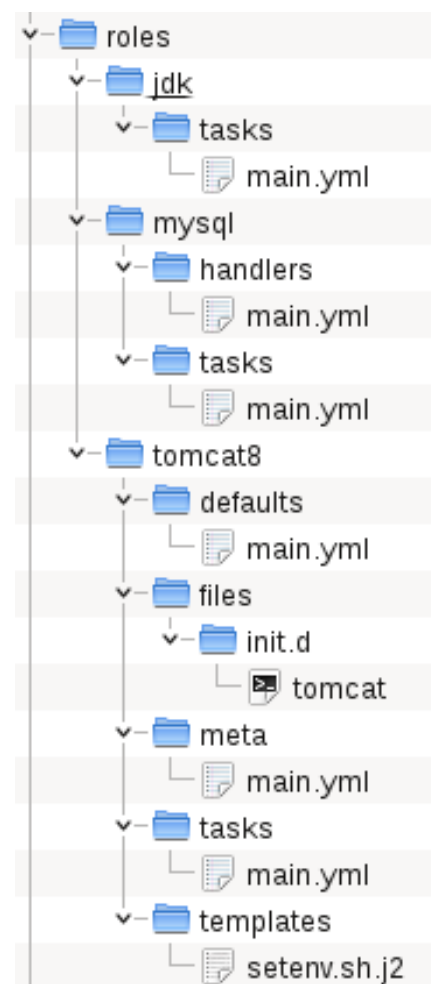


```
9 apt: name=openjdk-8-jdk state=present
10 become: yes
11 become_method: sudo
12
13 - name: Download current Tomcat 8 version
14   local_action: get_url url="http://archive.apache.org/dist/tomcat/tomcat-8/v{{
15   tomcat_version }}/bin/{{ tomcat_base_name }}.tar.gz" dest=/tmp
16
17 - name:
18   file: name=/opt mode=777
19   become: yes
20   become_method: sudo
21
22 - name: Install Tomcat 8
23   unarchive: src=/tmp/{{ tomcat_base_name }}.tar.gz dest=/opt creates=/opt/{{
24   tomcat_base_name }} owner=vagrant group=vagrant
25
26 - name: Set link to tomcat 8
27   file: src=/opt/{{ tomcat_base_name }} dest=/opt/tomcat state=link force=yes
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29 - name: setup setenv.sh
30   template: dest="/opt/{{ tomcat_base_name }}/bin/setenv.sh"
31   src="roles/tomcat8/templates/setenv.sh.j2" mode=755
32   when: catalina_opts is defined
33
34 - find: paths="/opt/{{ tomcat_base_name }}/bin" patterns="*.sh"
35   register: result
36
37 - name: ensure tomcat scripts are executable
38   file: name={{item.path}} mode=755
39   with_items: '{{ result.files }}'
40
41 - name: install init.d script for tomcat
42   copy: src=roles/tomcat8/files/init.d/tomcat dest=/etc/init.d/tomcat owner=vagrant
43   group=vagrant mode=755
44   become: yes
45   become_method: sudo
```

```
1 - hosts: database-server
2   become: yes
3   become_method: sudo
4
5   tasks:
6     - name: install mysql db
7       apt: name=mysql-server state=present
8
9     - name: installs python-mysqldb
10      apt: name=python-mysqldb state=present
11
12     - name: start mysql
13       service: name=mysql state=started
14
15     - name: set bind address
16       lineinfile: dest=/etc/mysql/mysql.conf.d/mysqld.cnf
17         line='bind-address = 0.0.0.0'
18         state=present
19         regexp=^bind-address(.*)
20       notify: restart mysql
21
22     - name: creates db user dba
23       mysql_user: name=dba password=g3h3lm priv=*.*:ALL,GRANT state=present host=%
24
25   handlers:
26     - name: restart mysql
27       service: name=mysql state=restarted
```

Roles

```
roles/  
  common/  
    files/  
    templates/  
    tasks/  
    handlers/  
    vars/  
    defaults/  
    meta/
```



Setup Playbooks mit Roles

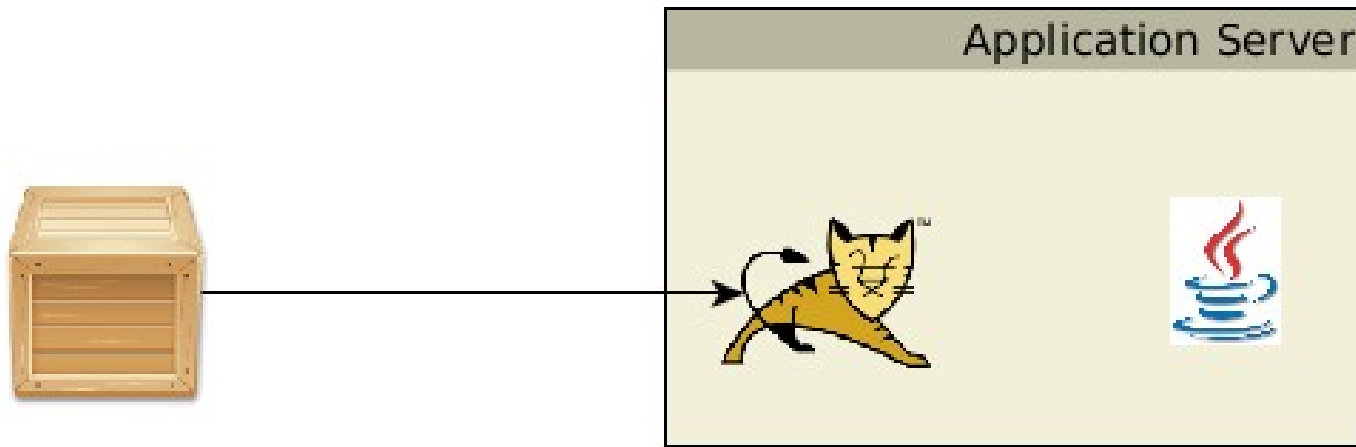
- Setup Application Server

```
1 - hosts: application-server
2   roles:
3     - jdk
4     - { role: tomcat8, tomcat_version: 8.5.8 }
5
```

- Setup Database Server

```
1 - hosts: database-server
2   roles:
3     - mysql
4
5
6 |
```

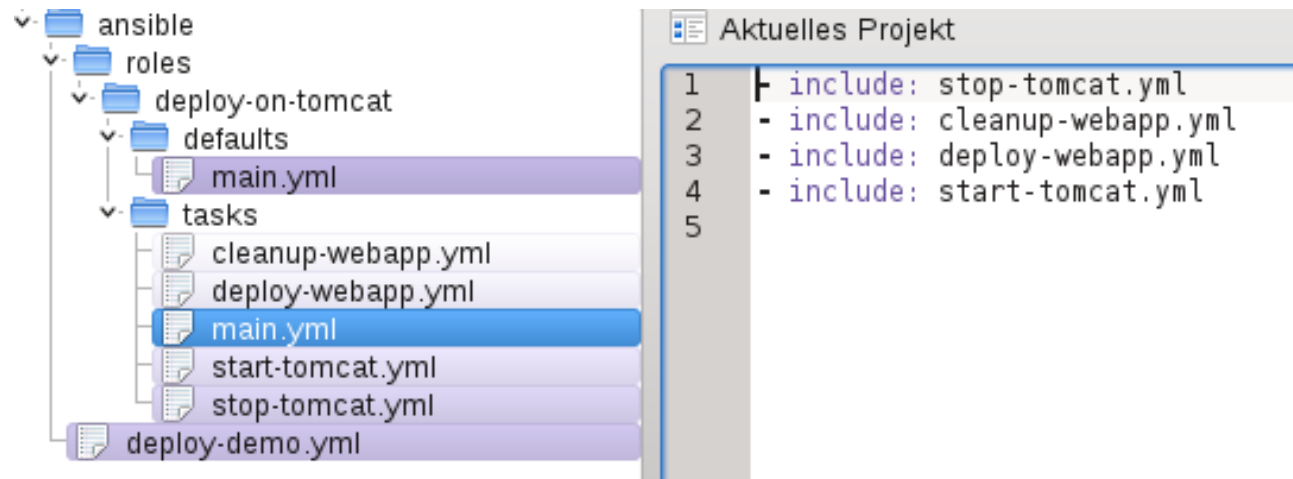
Java Webapplikation Deployment



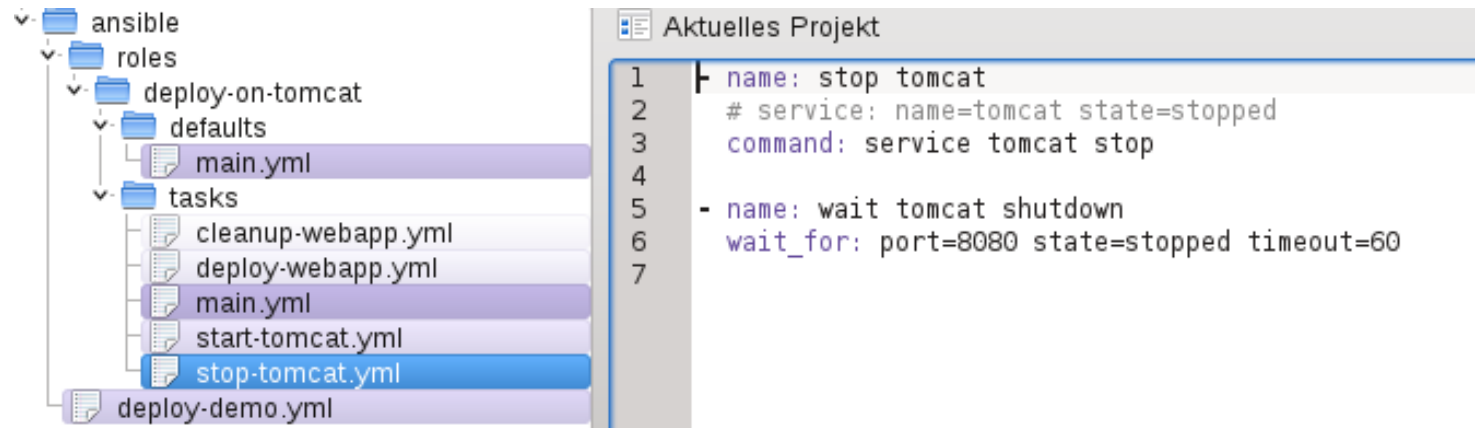
Deploy Application Playbook

```
1 - hosts: application-server
2   roles:
3     - {role: deploy-on-tomcat, webapp_source_path: ./demo-app-ansible-deploy-1.0-
  4       SNAPSHOT.war, webapp_target_name: demo }
```

deploy-on-tomcat Role



deploy-on-tomcat Role



The image shows a screenshot of an IDE with two panels. The left panel displays a file tree for an Ansible project. The right panel shows the content of the selected file, `stop-tomcat.yml`.

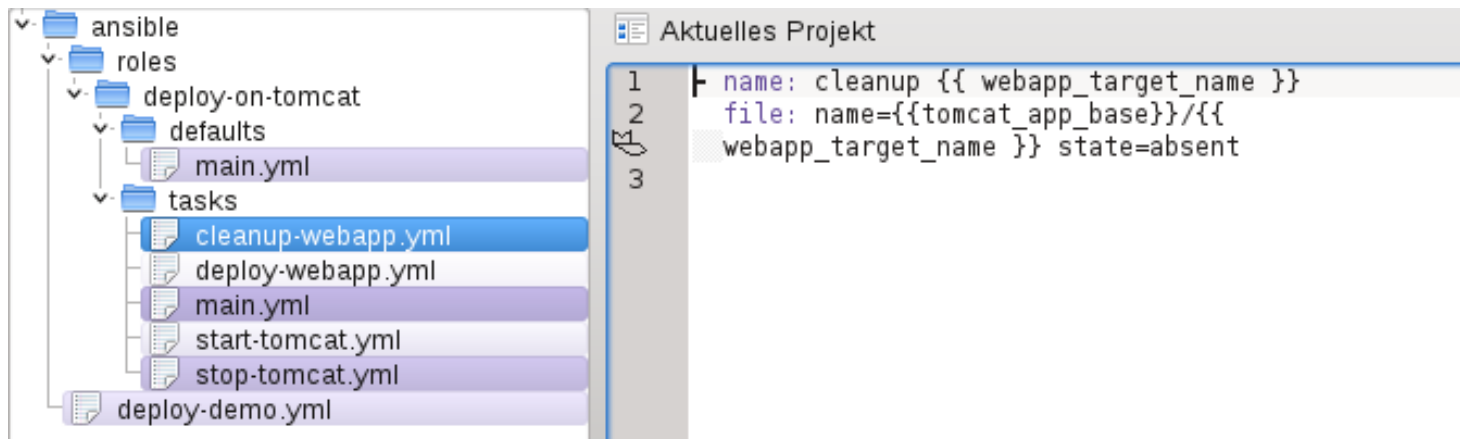
File Tree Structure:

- ansible
 - roles
 - deploy-on-tomcat
 - defaults
 - main.yml
 - tasks
 - cleanup-webapp.yml
 - deploy-webapp.yml
 - main.yml
 - start-tomcat.yml
 - stop-tomcat.yml (selected)
 - deploy-demo.yml

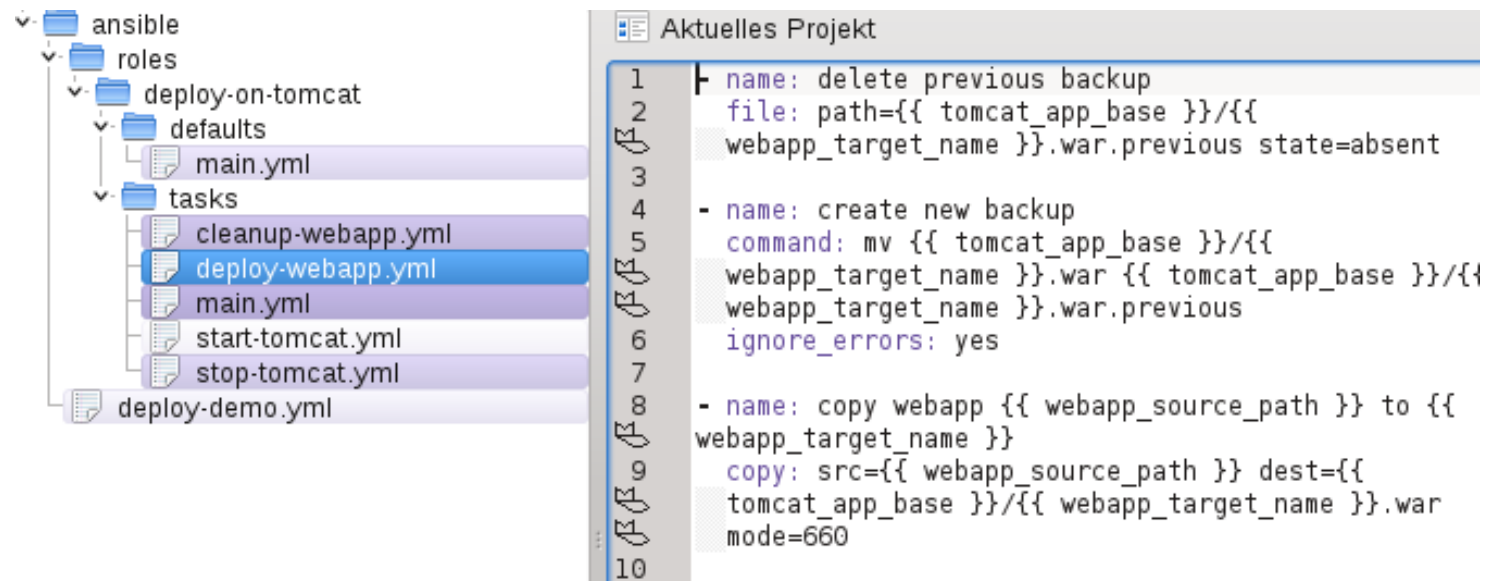
Content of `stop-tomcat.yml`:

```
1  name: stop tomcat
2    # service: name=tomcat state=stopped
3    command: service tomcat stop
4
5  - name: wait tomcat shutdown
6    wait_for: port=8080 state=stopped timeout=60
7
```


deploy-on-tomcat Role



deploy-on-tomcat Role



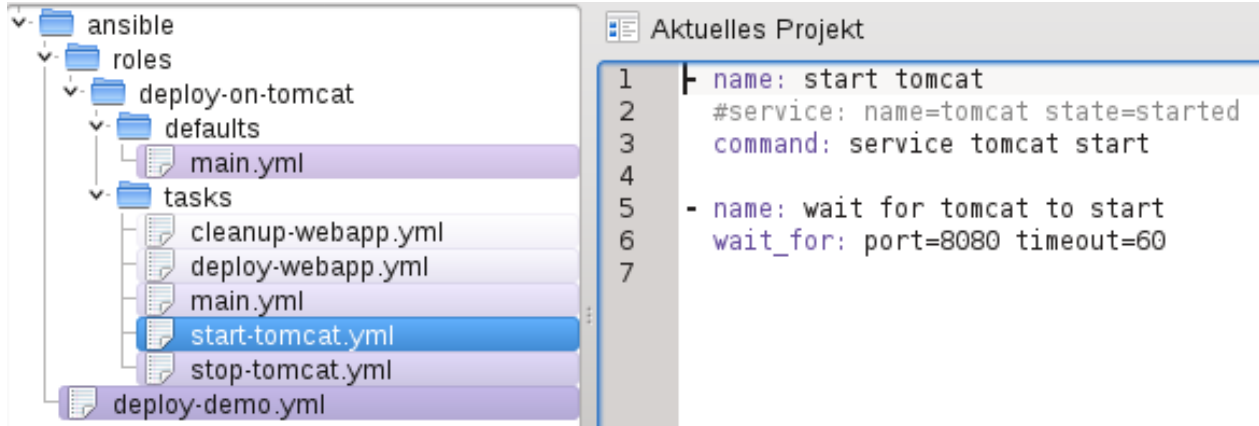
The image shows a screenshot of an IDE with two panels. The left panel displays a file explorer for an Ansible project structure:

- ansible
 - roles
 - deploy-on-tomcat
 - defaults
 - main.yml
 - tasks
 - cleanup-webapp.yml
 - deploy-webapp.yml (highlighted)
 - main.yml
 - start-tomcat.yml
 - stop-tomcat.yml
 - deploy-demo.yml

The right panel, titled 'Aktuelles Projekt', shows the content of the selected `deploy-webapp.yml` file, which contains three tasks:

```
1  name: delete previous backup
2  file: path={{ tomcat_app_base }}/{{
3  webapp_target_name }}.war.previous state=absent
4
5  - name: create new backup
6    command: mv {{ tomcat_app_base }}/{{
7    webapp_target_name }}.war {{ tomcat_app_base }}/{{
8    webapp_target_name }}.war.previous
9    ignore_errors: yes
10
11 - name: copy webapp {{ webapp_source_path }} to {{
12 webapp_target_name }}
13   copy: src={{ webapp_source_path }} dest={{
14 tomcat_app_base }}/{{ webapp_target_name }}.war
15   mode=660
```

deploy-on-tomcat Role



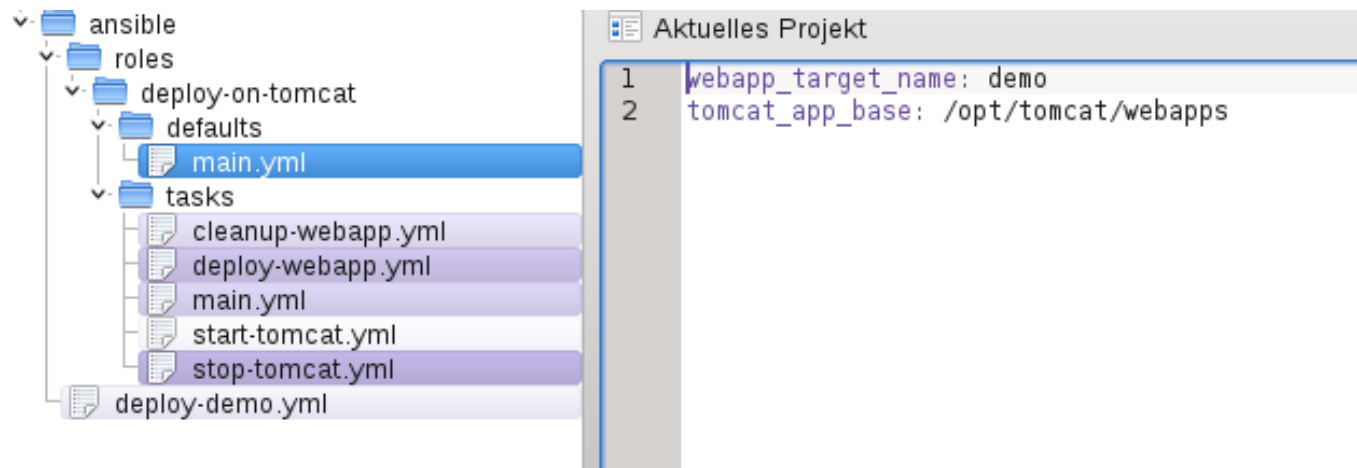
The screenshot displays an IDE interface with a file explorer on the left and a task editor on the right. The file explorer shows the following structure:

- ansible
 - roles
 - deploy-on-tomcat
 - defaults
 - main.yml
 - tasks
 - cleanup-webapp.yml
 - deploy-webapp.yml
 - main.yml
 - start-tomcat.yml (highlighted)
 - stop-tomcat.yml
 - deploy-demo.yml

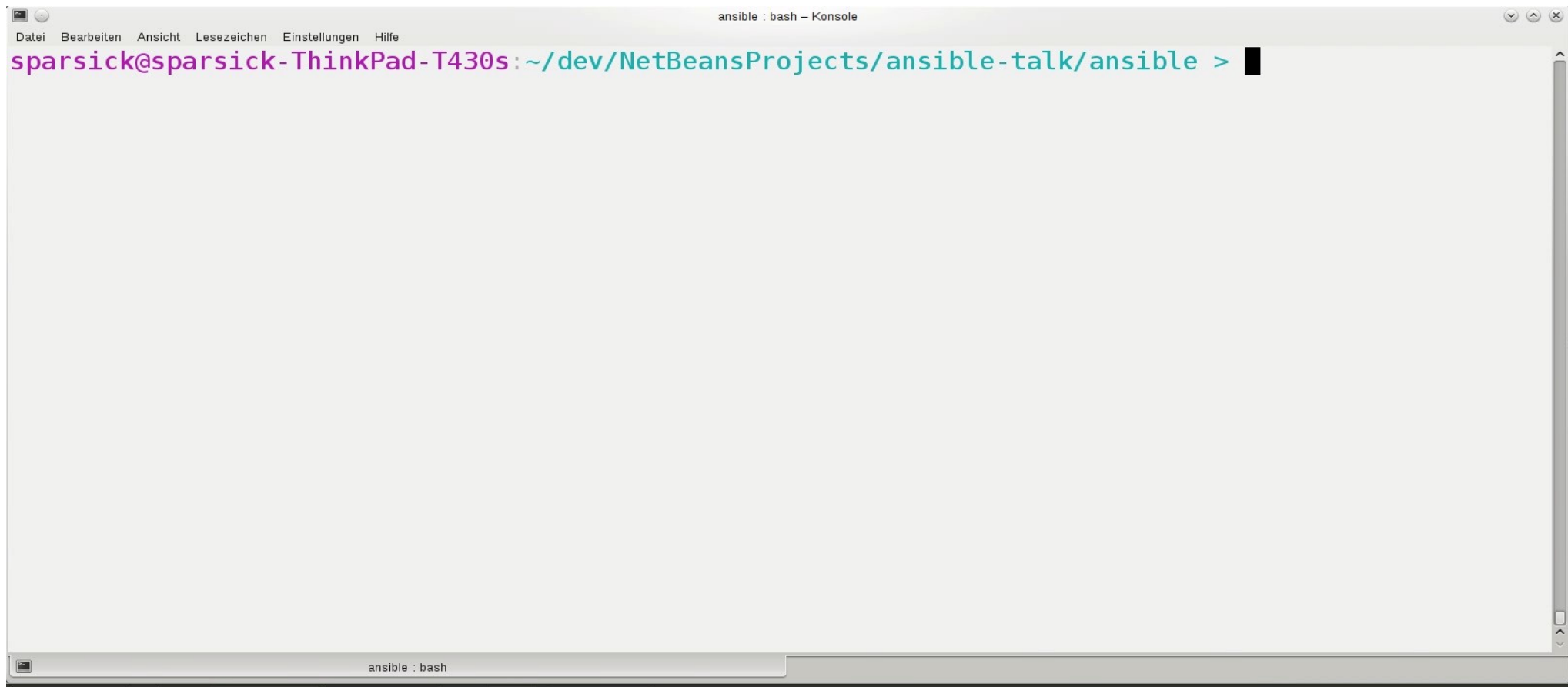
The task editor on the right, titled "Aktuelles Projekt", shows the following tasks:

```
1 | name: start tomcat
2 | #service: name=tomcat state=started
3 | command: service tomcat start
4 |
5 | - name: wait for tomcat to start
6 |   wait_for: port=8080 timeout=60
7 |
```

deploy-on-tomcat Role



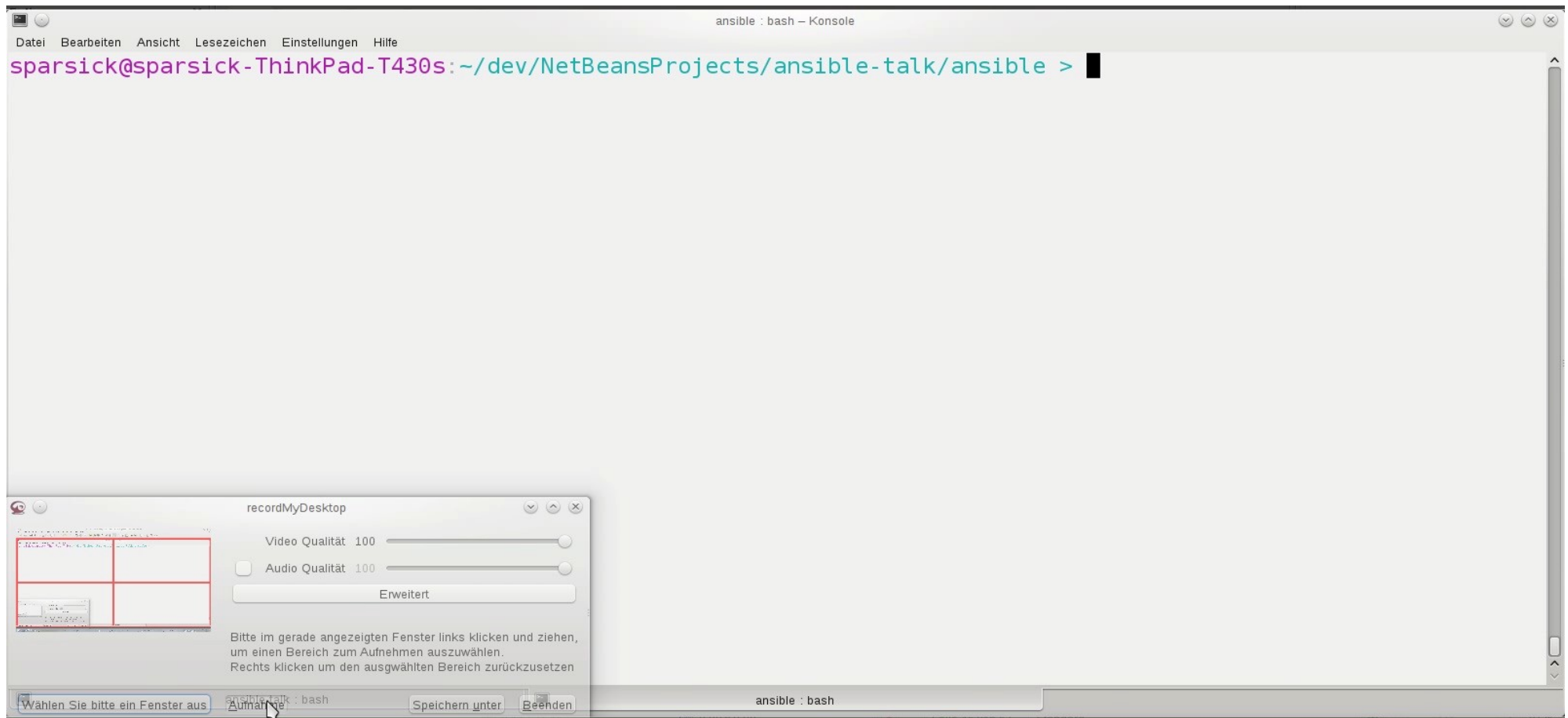
Deploy Application Playbook



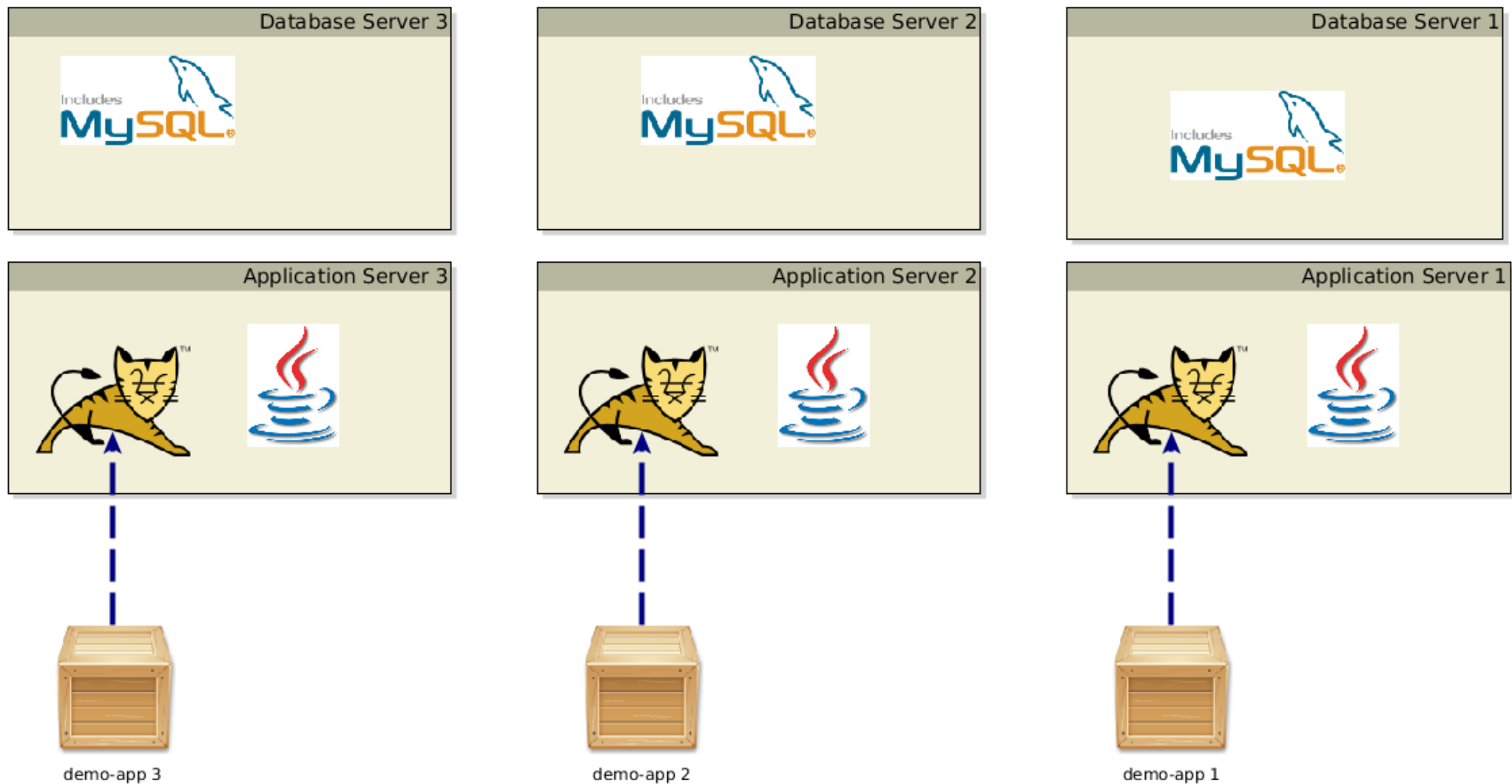
The image shows a terminal window with a menu bar at the top containing 'Datei', 'Bearbeiten', 'Ansicht', 'Lesezeichen', 'Einstellungen', and 'Hilfe'. The window title is 'ansible : bash - Konsole'. The prompt is 'sparsick@sparsick-ThinkPad-T430s:~/dev/NetBeansProjects/ansible-talk/ansible >'. The terminal area is mostly empty with a vertical scrollbar on the right. At the bottom, there is a tab labeled 'ansible : bash'.

```
ansible : bash - Konsole
Datei Bearbeiten Ansicht Lesezeichen Einstellungen Hilfe
sparsick@sparsick-ThinkPad-T430s:~/dev/NetBeansProjects/ansible-talk/ansible >
ansible : bash
```







Ad-hoc-Kommando



Warum Roles?



Warum Roles?

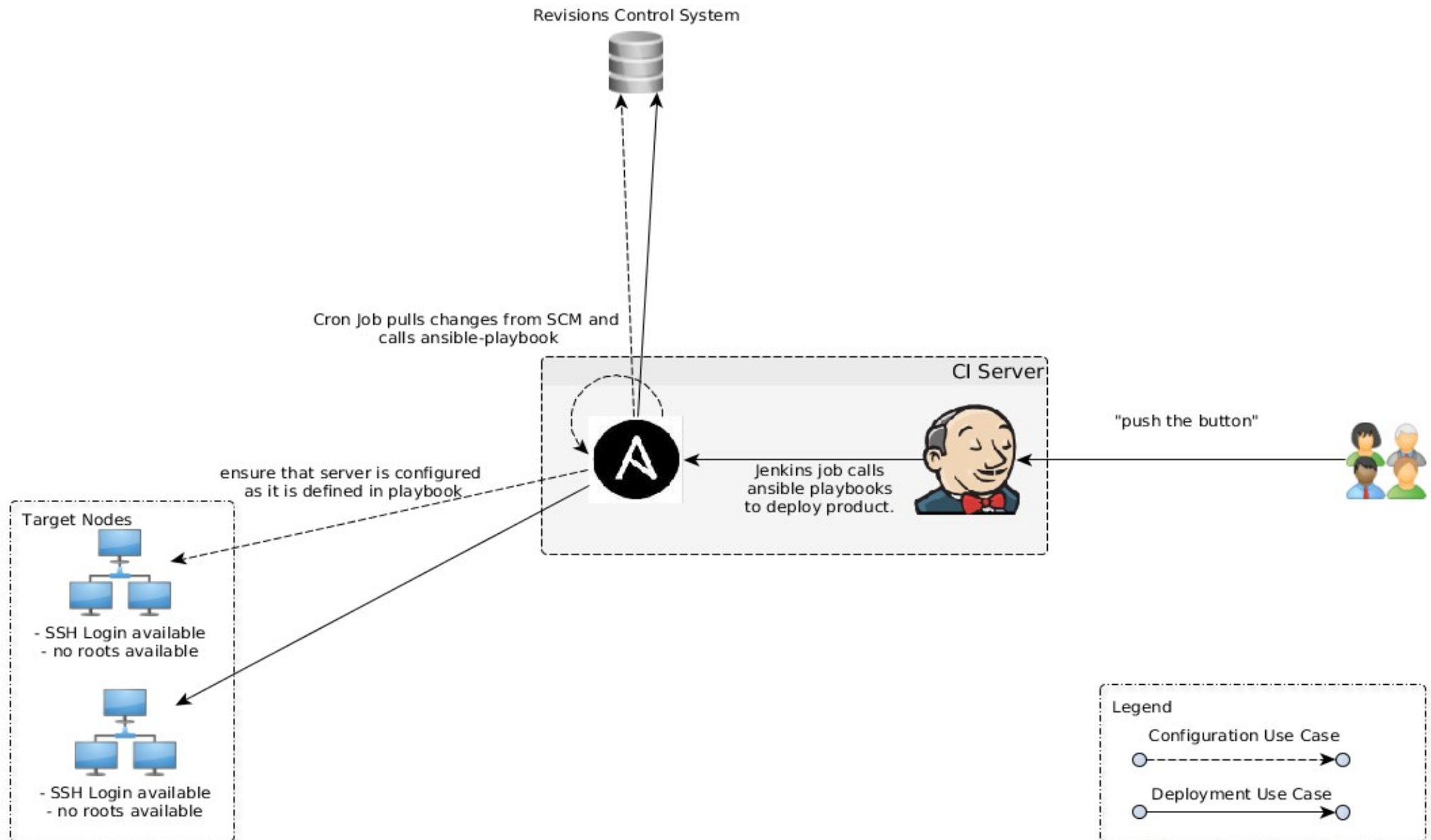
	deploy-demo1-app.yml
	deploy-demo2-app.yml
	setup-demo1-app-server.yml
	setup-demo1-database.yml
	setup-demo2-app-server.yml
	setup-demo2-database.yml

Warum Roles?


```
1 - hosts: demo1-application-server
2   roles:
3     - {role: deploy-on-tomcat, webapp_source_path: ./demo1-1.0-
4       SNAPSHOT.war, webapp_target_name: demo1 }
```

```
1 - hosts: demo2-application-server
2   roles:
3     - {role: deploy-on-tomcat, webapp_source_path: ./demo2-1.0-
4       SNAPSHOT.war, webapp_target_name: demo2 }
5
```

Ansible Infrastruktur





Ansible Tower

TOWER

OrganizationsUsersTeamsCredentialsProjectsInventoriesJob TemplatesJobs

● Hello, admin



0
Hosts

0
Failed Hosts

1
Inventories

1
Inventory Sync Failures

0
Projects

0
Project Sync Failures

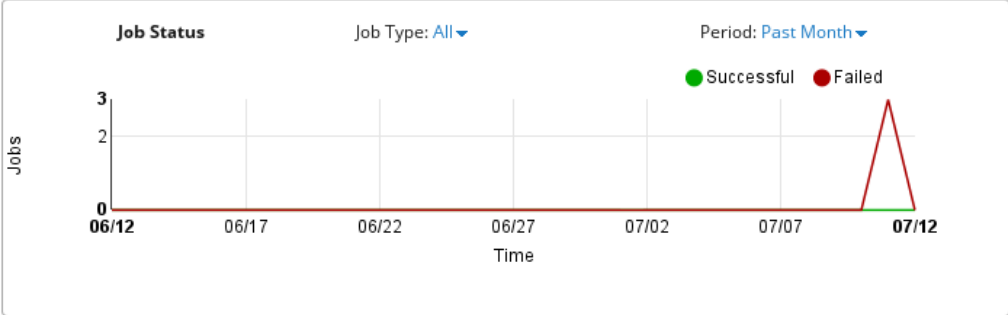
Job Status

Job Type: All

Period: Past Month

● Successful

● Failed



Host Status










No Host data

Jobs

Schedule

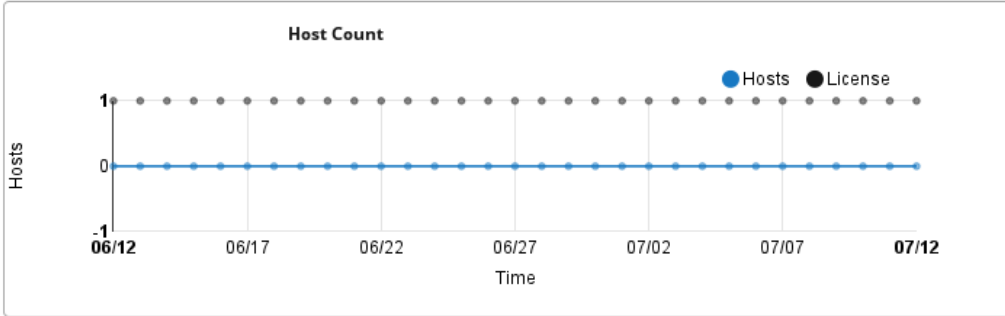
Name

Search

ID	Status	Started	Type	Name	Actions
3	❌	07/11 15:45:22	Inventory Sync	CCCC (Integration)	  
2	❌	07/11 15:44:58	Inventory Sync	CCCC (Integration)	  
1	❌	07/11 15:43:21	Inventory Sync	CCCC (Integration)	  

Page 1 of 1 (3 items)

Host Count



Weitere Features

- Vault – Verschlüsselung
- Facts
- Dynamische Inventories
- Playbook Debugger
- Module für Docker
- Ansible Container
- Networking Support

Wie werden Ansible Skripte getestet?

- `ansible-playbook --check`
- `ansible-playbook --syntax-check`
- Jenkins + Vagrant
- Rspec tests



ServerSpec Tests

```
1 require 'spec_helper'
2
3 describe package('mysql-server') do
4   it { should be_installed }
5 end
6
7 describe service('mysql') do
8   it { should be_enabled }
9   it { should be_running }
10 end
11
12 describe 'MySQL config parameters' do
13   context mysql_config('bind-address') do
14     its(:value) { should eq '0.0.0.0' }
15   end
16 end
17
```

```
1 require 'spec_helper'
2
3 describe package('openjdk-8-jdk') do
4   it { should be_installed }
5 end
6
7 describe command('ls /etc/init.d/tomcat') do
8   its(:exit_status) { should eq 0 }
9 end
10
11 describe command('ls /opt/tomcat') do
12   its(:exit_status) { should eq 0 }
13 end
14
```

ServerSpec Tests



Wie unterscheidet sich Ansible zu seiner Konkurrenz?

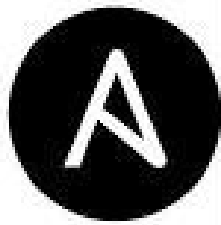


Vergleich



- Orchestrierung über SSH
- Benötigt keine Rootrechte auf Zielsystem
- Konfigurationsmgmt + Applikationsdeployment
- Monitoringtool nur in der Enterprise Variante
- Skripte mehr imperativ
- Windows-Support rudimentär
- Skripte OS- bzw. Distributions-spezifisch

- Client-Server Architektur
- Für komfortables Arbeiten benötigt es Rootrechte
- Konfigurationsmgmt
- Monitoringtools Open Source
- Skripte mehr deklarativ
- Windows-Support
- Skripte können OS-unspezifisch sein



Vergleich



```
- name: add nodejs ppa
  apt_repository: repo='ppa:chris-lea/node.js'

- name: install nodejs package
  apt: name=nodejs update-cache=yes
```

```
▼ class nodejs {
  ▼ class { 'apt':
    }
  ▼ exec { 'apt-get-update':
    command => '/usr/bin/apt-get update',
    }
  ▼ package {'software-properties-common' :
    ensure=> installed,
    require => Exec['apt-get-update'],
    }

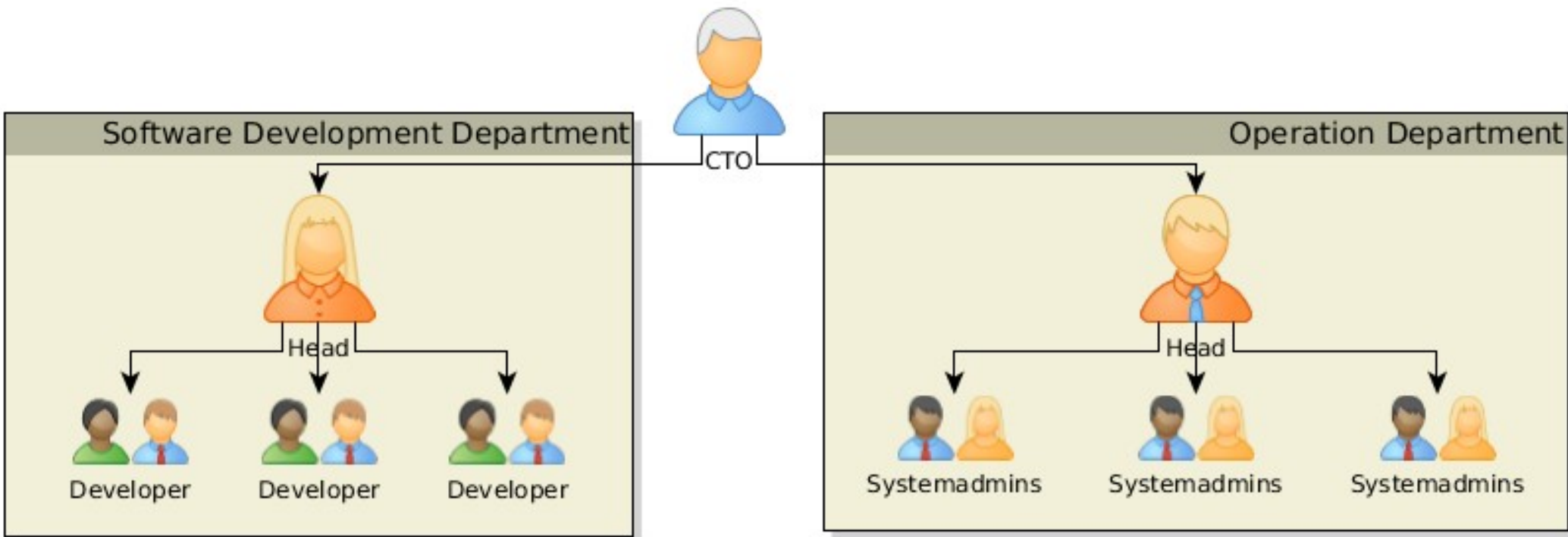
  apt::ppa {'ppa:chris-lea/node.js' :}

  ▼ package { 'nodejs' :
    ensure => installed,
    require => Apt::Ppa ['ppa:chris-lea/node.js'],
    }
}
```

Weitere Einsatzszenarien aus Entwicklersicht

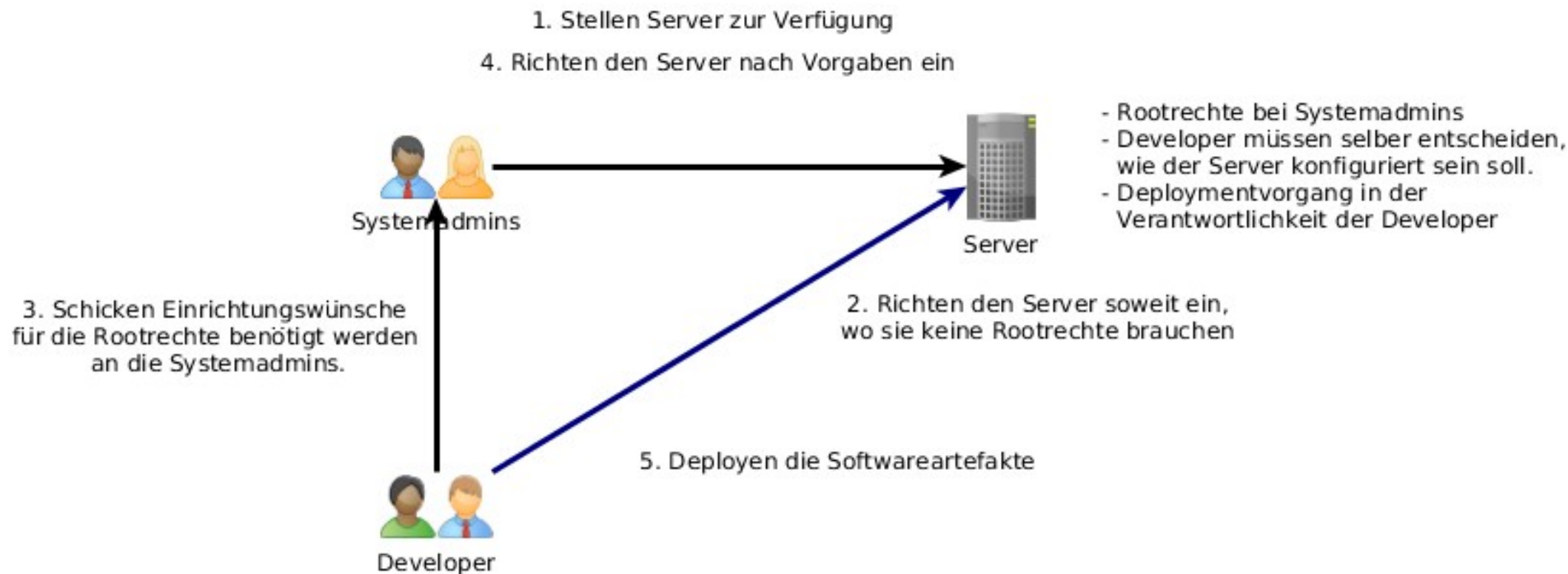
Systemkonfiguration für Entwickler

Organisatorische Ausgangslage
Realität



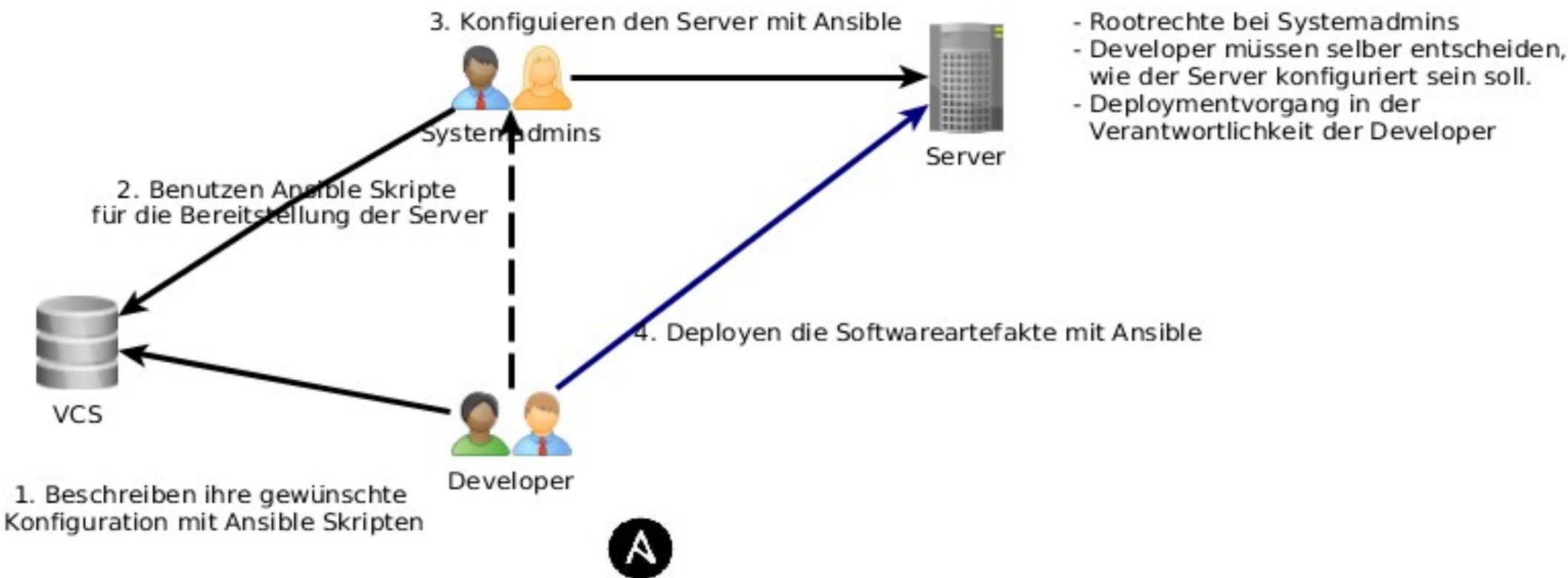
Systemkonfiguration für Entwickler

Prozess zwischen Development und Operation



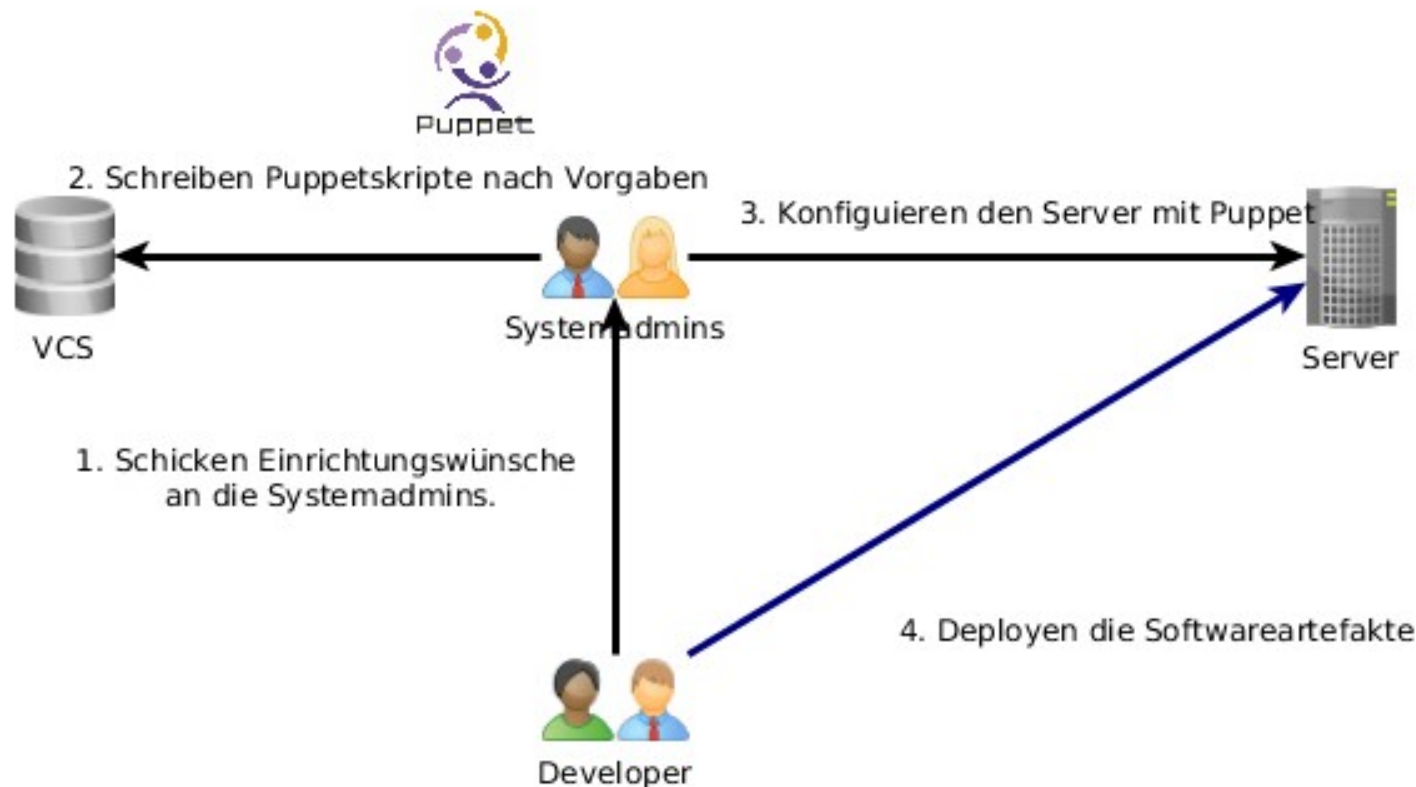
Systemkonfiguration für Entwickler

Lösungsidee mit Ansible



Systemkonfiguration für Entwickler

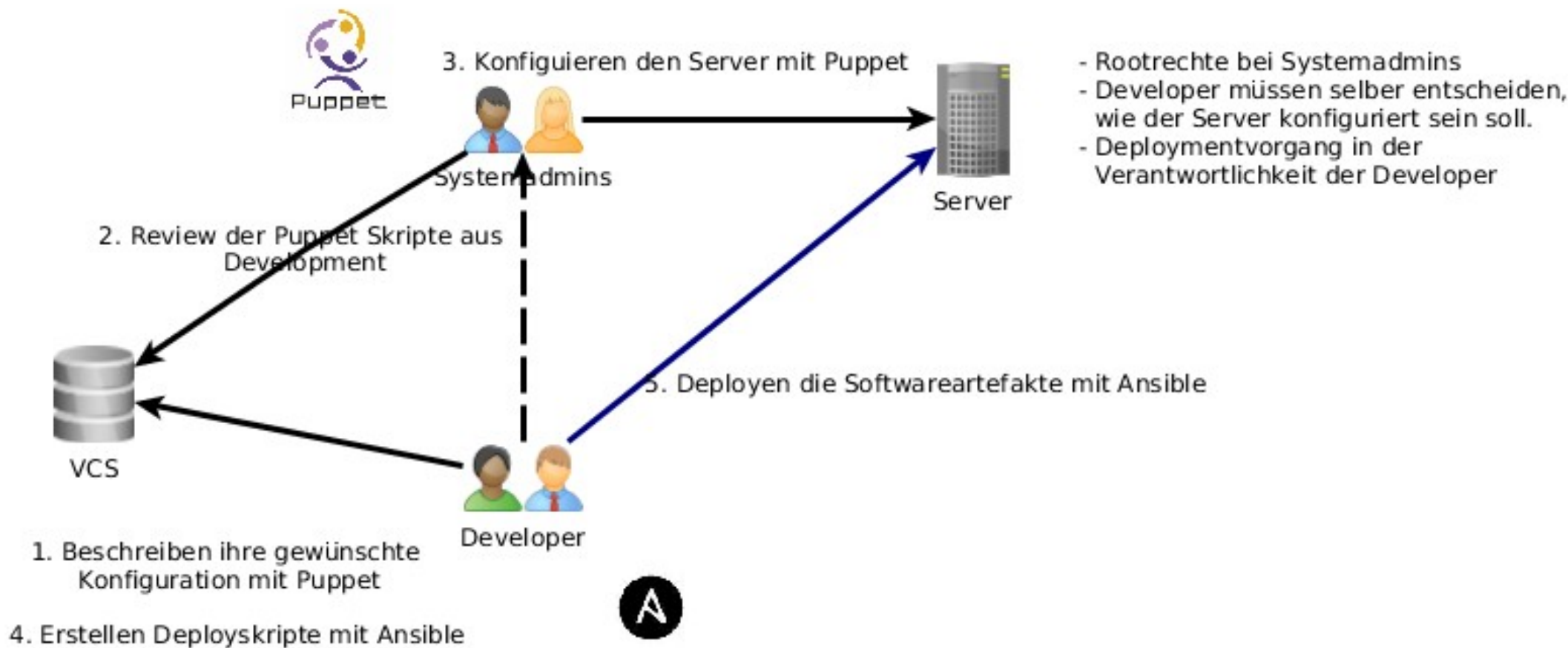
Variante - Prozess zwischen Development und Operation



- Rootrechte bei Systemadmins
- Developer müssen selber entscheiden, wie der Server konfiguriert sein soll.
- Deploymentvorgang in der Verantwortlichkeit der Developer

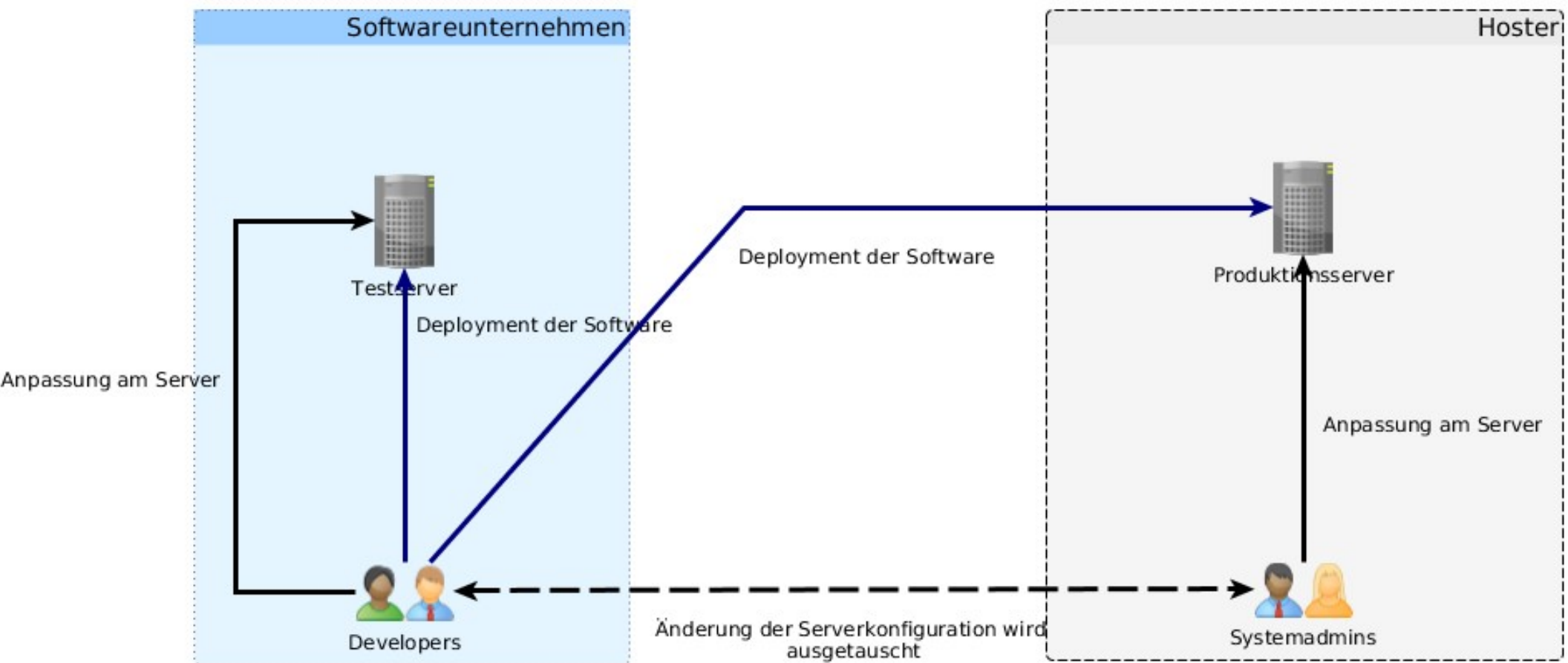
Systemkonfiguration für Entwickler

Lösungsvariante



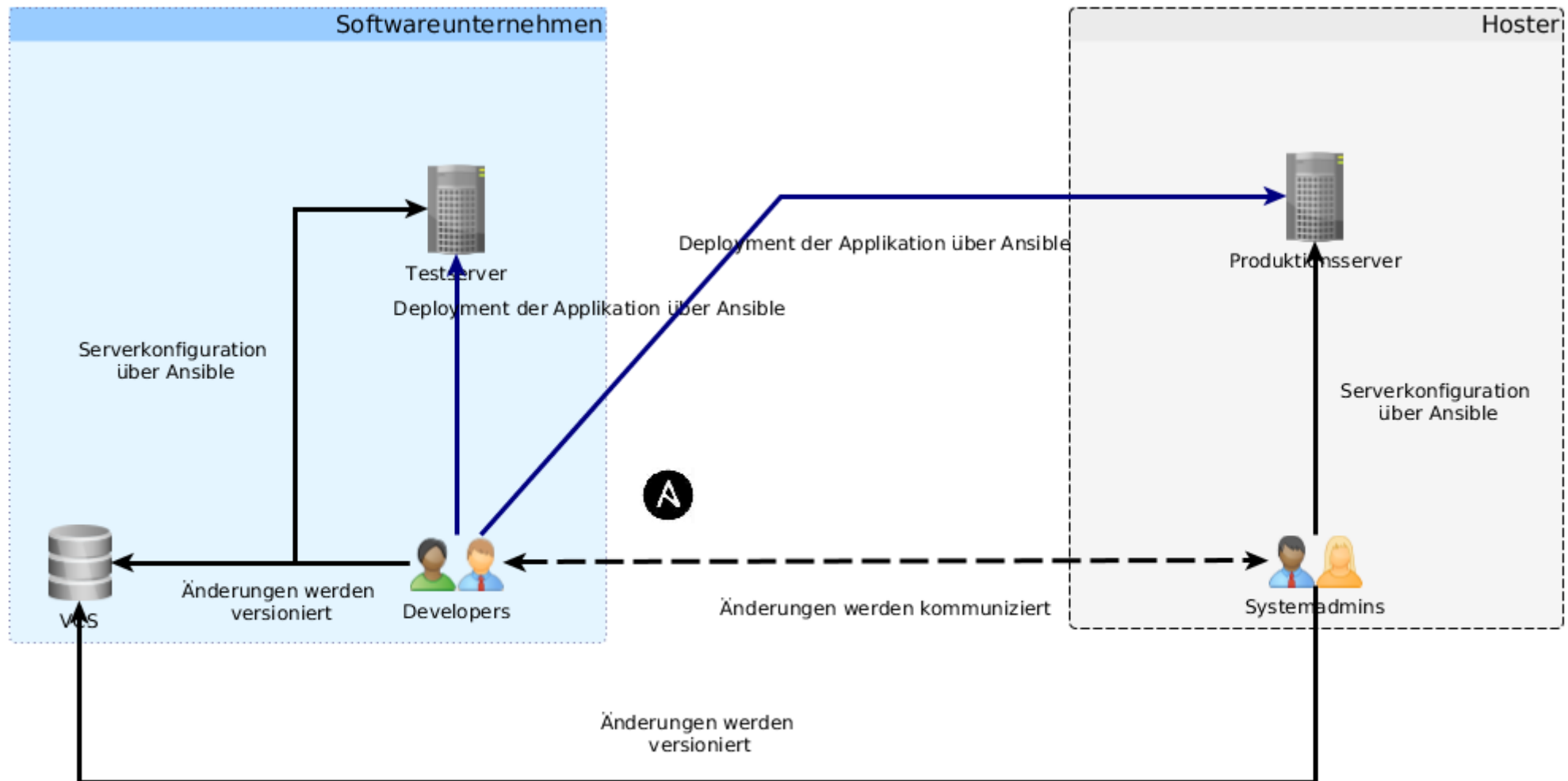
Systemkonfiguration für Entwickler

Produktionsserver sind beim externen Hoster

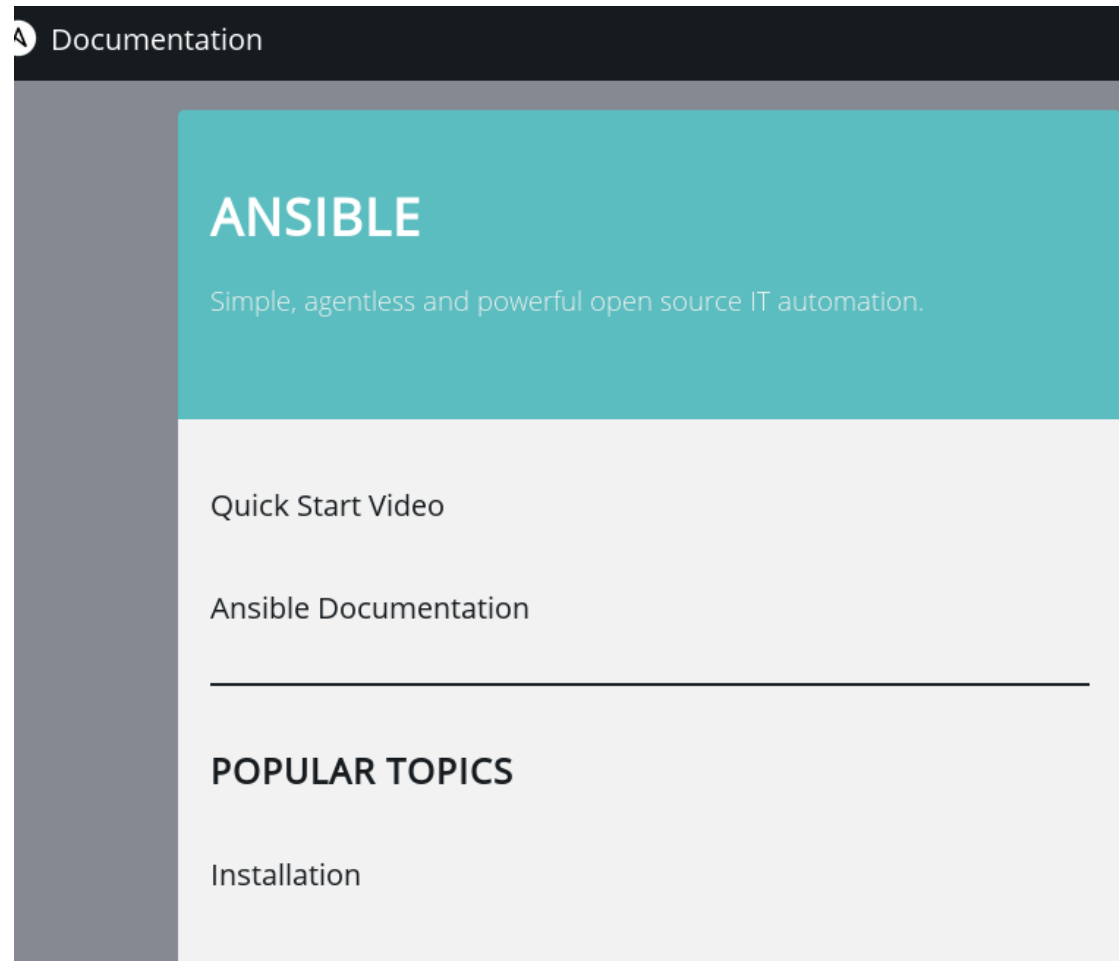


Systemkonfiguration für Entwickler

Lösungsidee

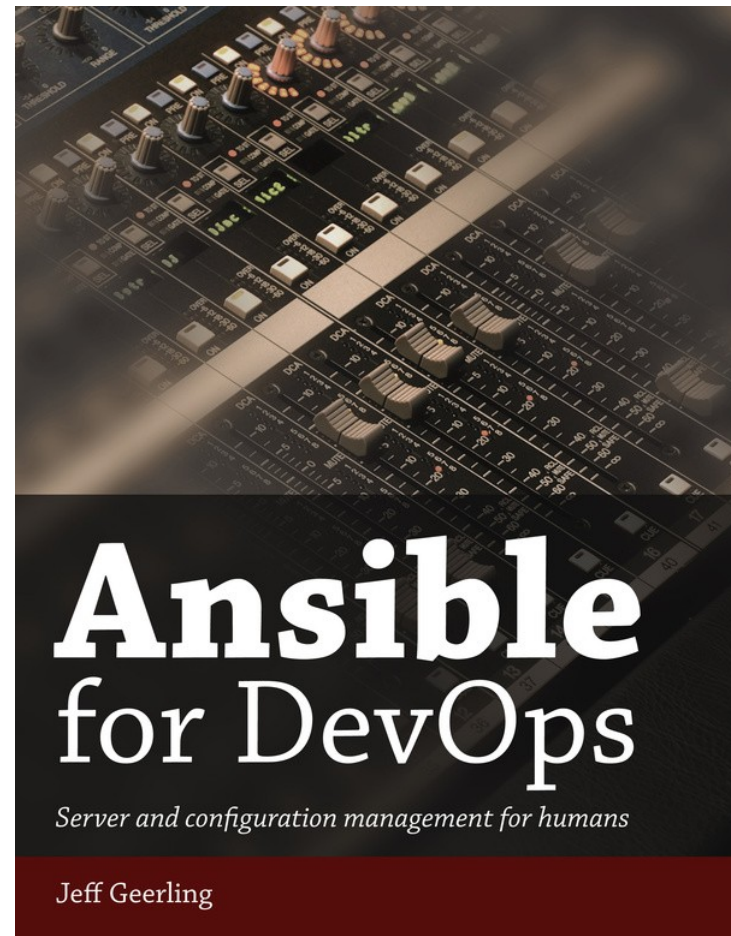
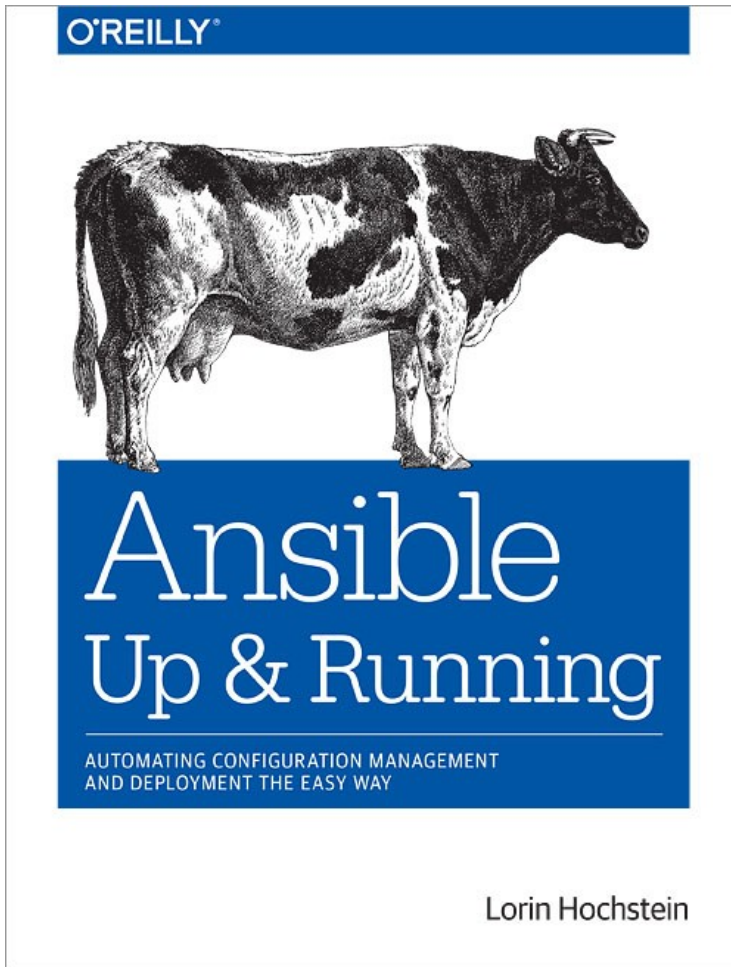


Weitere Informationen



<http://docs.ansible.com/>

Weitere Informationen



Weitere Informationen



<http://bit.ly/2cZ0lrZ>



JUnit 5
Das nächste große
Release steht vor
der Tür

Ansible
Konfigurationsmana-
gement auch für
Entwickler

Spring Boot Starter
Komfortable Modula-
risierung und Konfi-
guration



Fragen?

@SandraParsick

mail@sandra-parsick.de

<https://github.com/sparsick/ansible-talk.git>