DevOpsCon

Sandra Parsick | Freelancer

Ansible für Entwickler

Zur meiner Person

- Sandra Parsick
- Freiberuflicher Softwareentwickler und Consultant im Java-Umfeld
- Schwerpunkte:
  - Java Enterprise Anwendungen
  - Agile Methoden
  - Software Craftmanship
  - Automatisierung von Entwicklungsprozessen
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- Xing: https://www.xing.com/profile/SandraParsick
- Blog: http://blog.sandra-parsick.de
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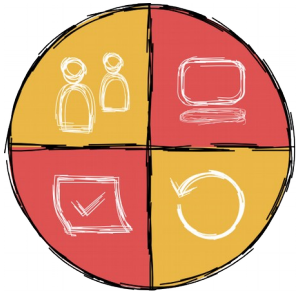


Agenda

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

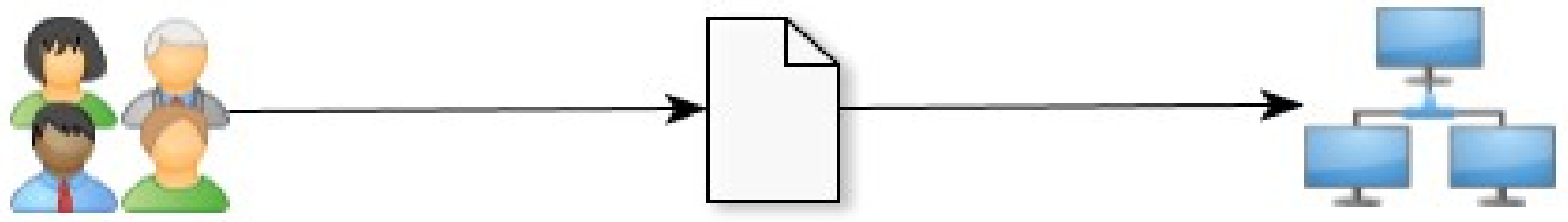
Konfigurationsmanagement (KM)

„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“



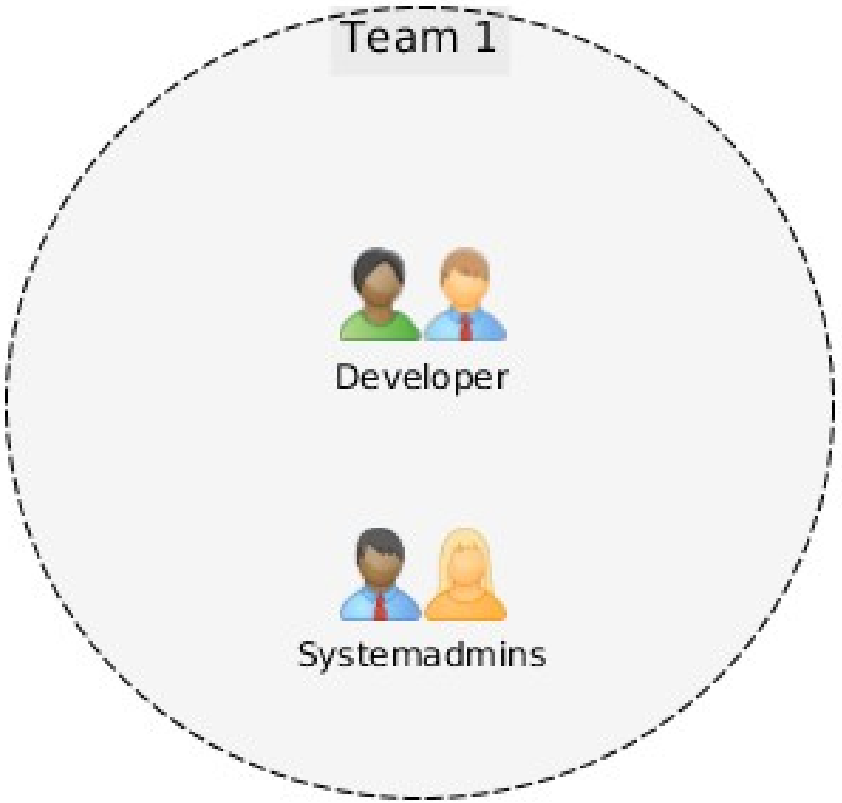
Systemkonfiguration - „Infrastructure As Code“

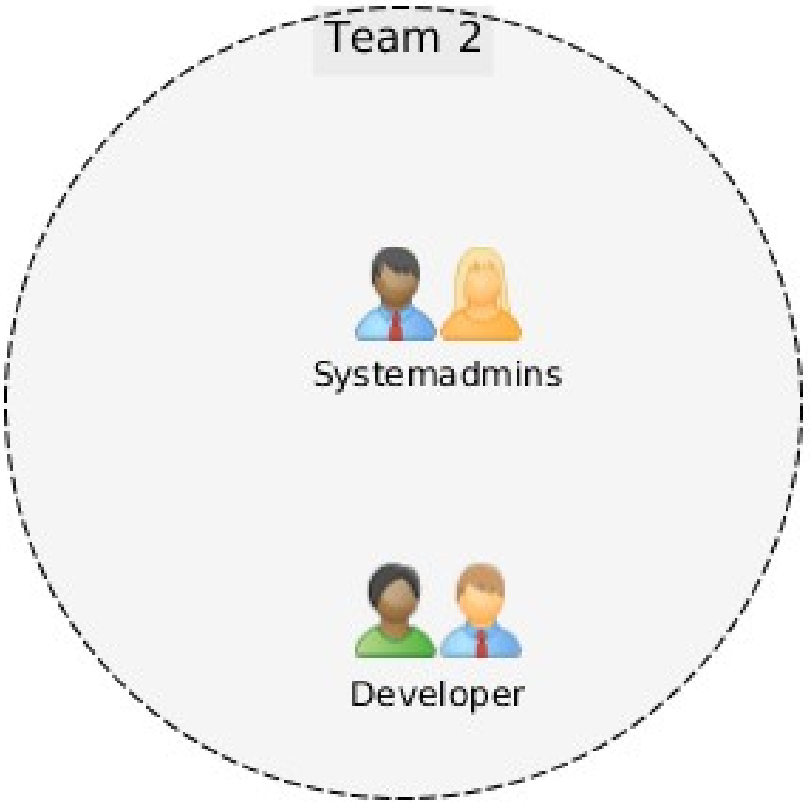
Ansible

Warum ist es für Entwickler interessant?

Systemkonfiguration für Entwickler

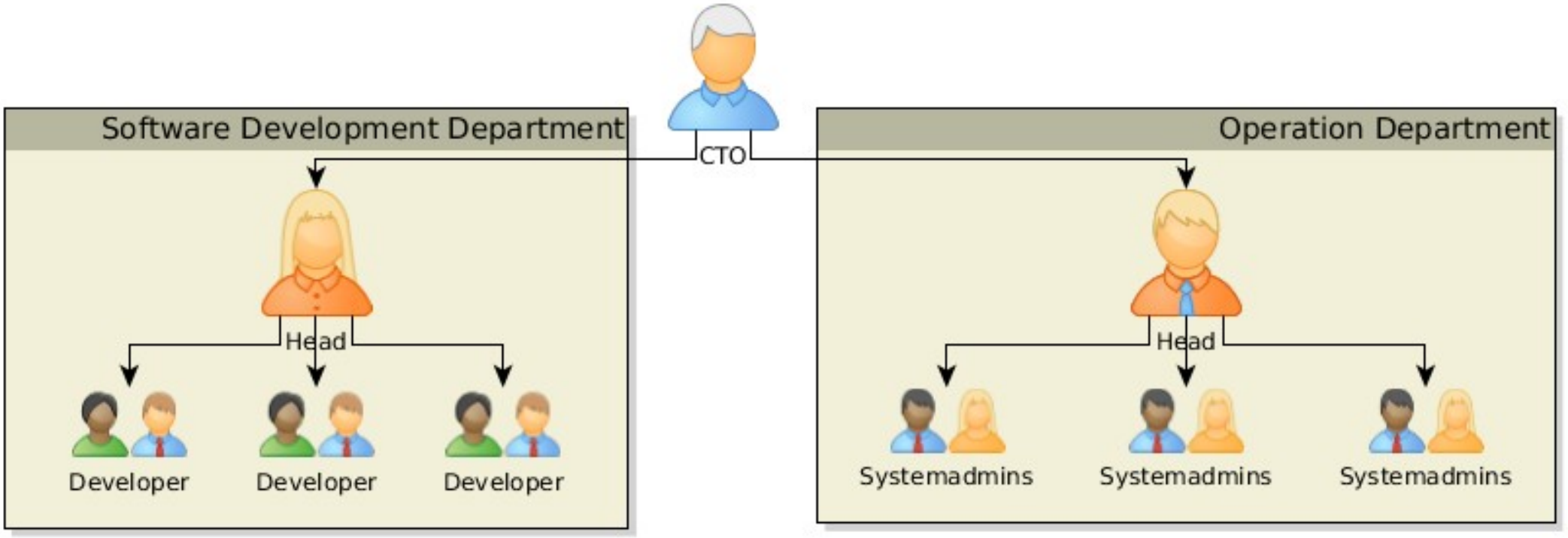
Organisatorische Ausgangslage
Wunsch





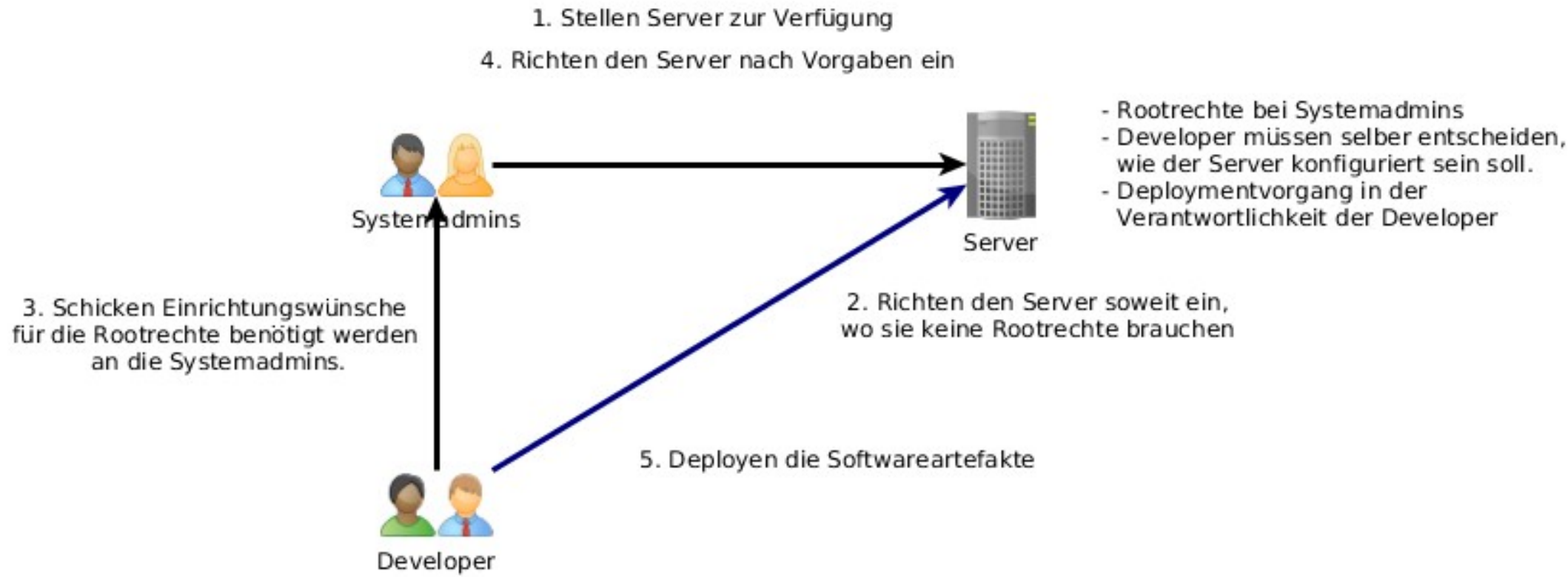
Systemkonfiguration für Entwickler

Organisatorische Ausgangslage
Realität



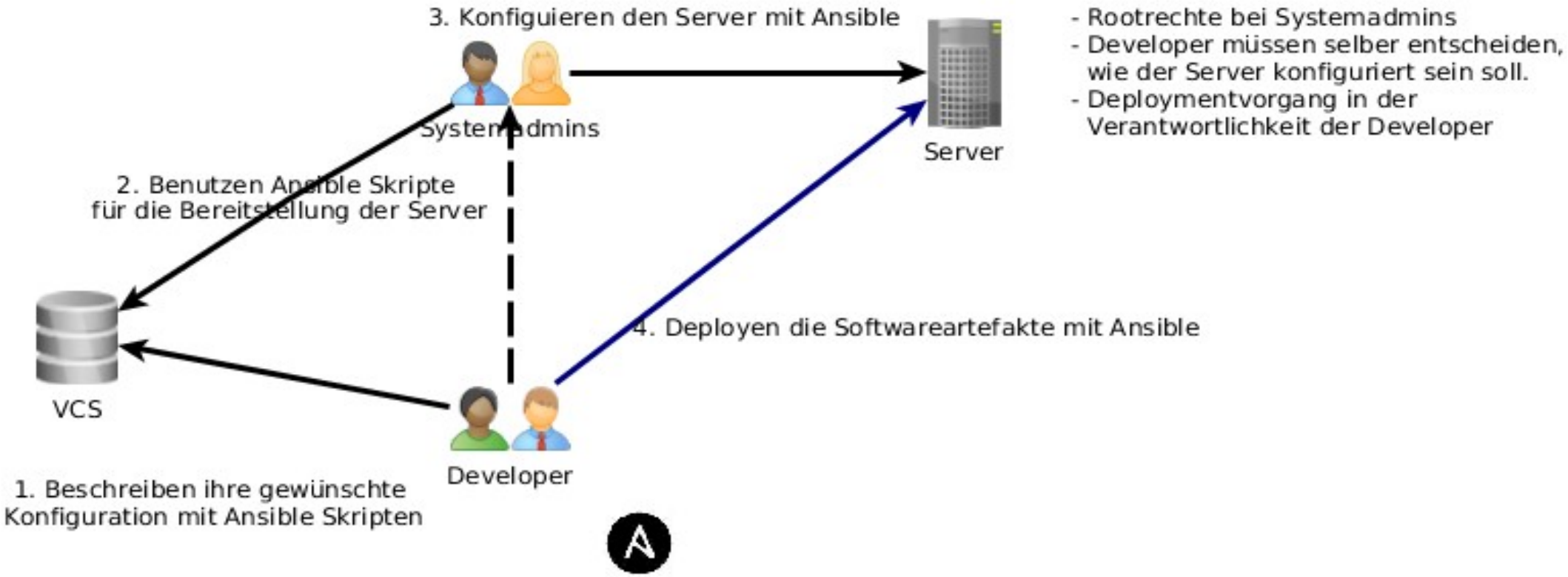
Systemkonfiguration für Entwickler

Prozess zwischen Development und Operation



Systemkonfiguration für Entwickler

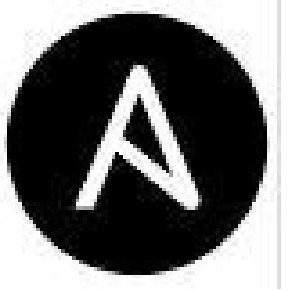
Lösungidee mit Ansible



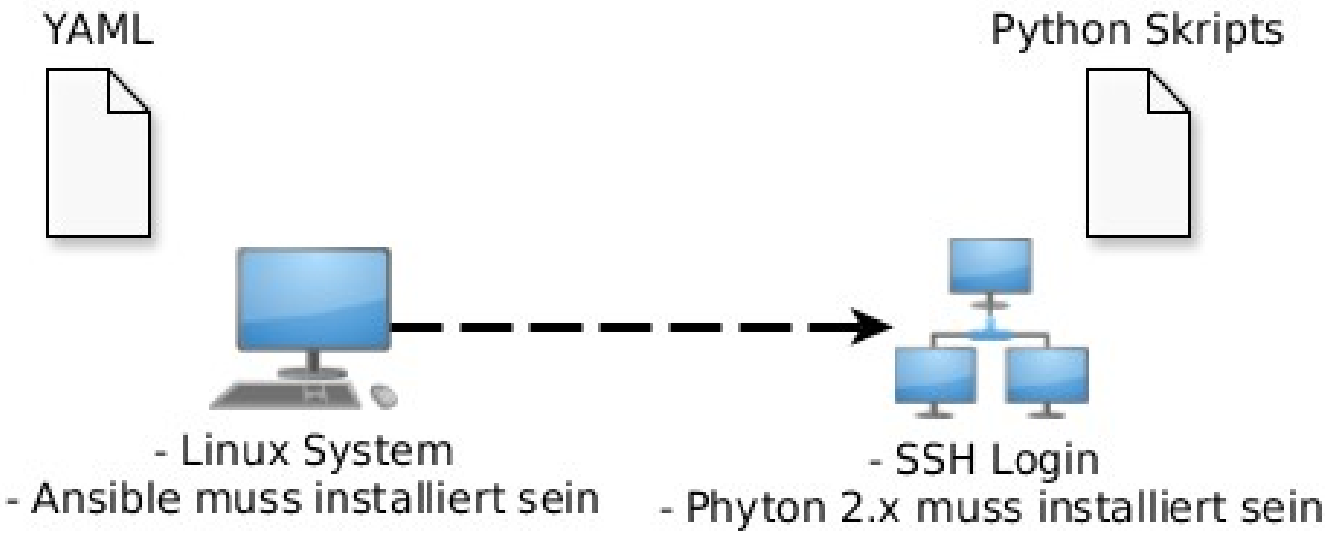
Einführung in Ansible

Ansible

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



Funktionsweise



Exkurs: YAML

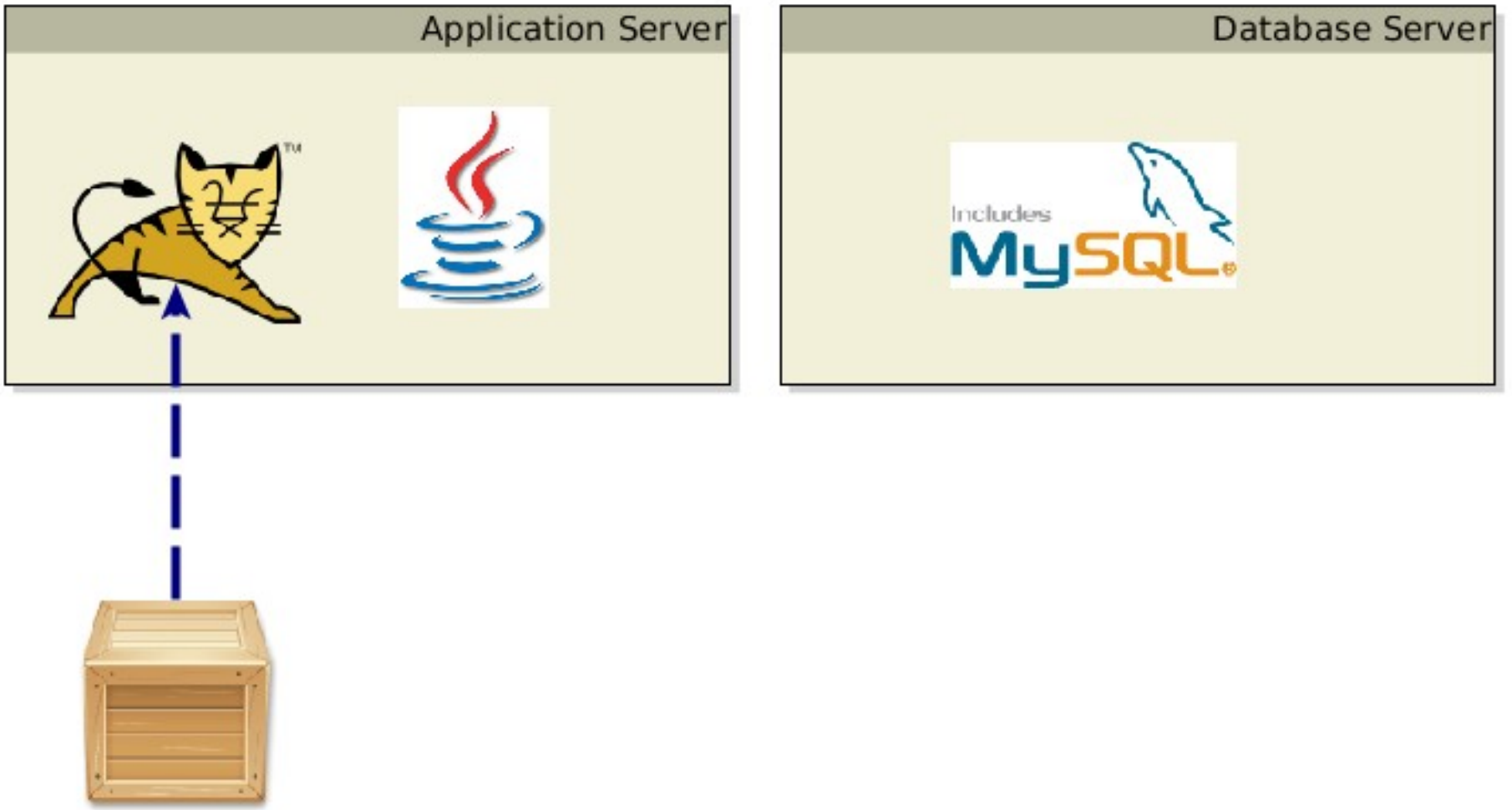
YAML

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

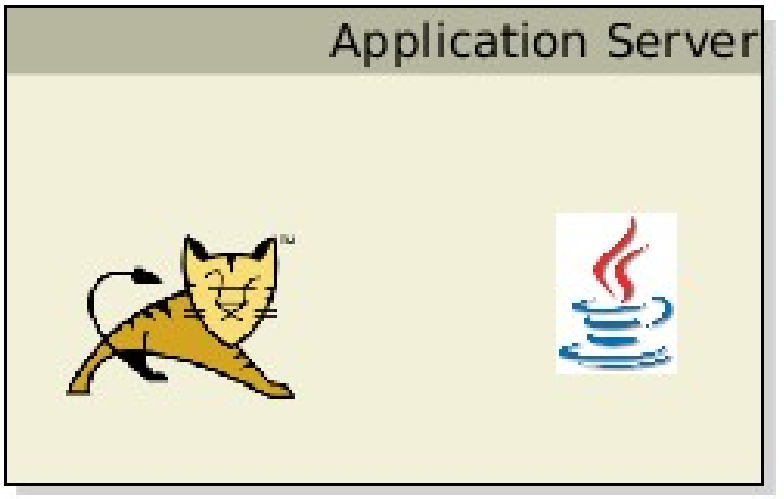
JSON

```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



```yaml
- hosts: application-server
  vars:
    tomcat_version: 8.5.8
    tomcat_base_name: apache-tomcat-{{ tomcat_version }}
    #catalina_opts: "-Dkey=value"

  tasks:
    - name: install java
      apt: name=openjdk-8-jdk state=present
      become: yes
      become_method: sudo

    - name: Download current Tomcat 8 version
      local_action: get_url url="http://archive.apache.org/dist/tomcat/tomcat-8/v{{ tomcat_version }}/bin/{{ tomcat_base_name }}.tar.gz" dest=/tmp

    - name:
      file: name=/opt mode=777
      become: yes
      become_method: sudo

    - name: Install Tomcat 8
      unarchive: src=/tmp/{{ tomcat_base_name }}.tar.gz dest=/opt creates=/opt/{{ tomcat_base_name }} owner=vagrant group=vagrant

    - name: Set link to tomcat 8
      file: src=/opt/{{ tomcat_base_name }} dest=/opt/tomcat  state=link force=yes

    - name: setup setenv.sh
      template: dest="/opt/{{ tomcat_base_name }}/bin/setenv.sh" src="roles/tomcat8/templates/setenv.sh.j2" mode=755
      when: catalina_opts is defined

    - find: paths="/opt/{{ tomcat_base_name }}/bin" patterns="*.sh"
      register: result

    - name: ensure tomcat scripts are executable
      file: name={{item.path}} mode=755
```

Inventories

Production

```
[application-server]
192.168.33.10
ubuntu-server db_host=mysql01

[mysql-db-server]
mysql[01:10]

[oracle-db-server]
db-[a:f].oracle.company.com

[database-server:children]
mysql-db-server
oracle-db-server

[application-server:vars]
message="Welcome"

[database-server:vars]
message="Hello World!"
```

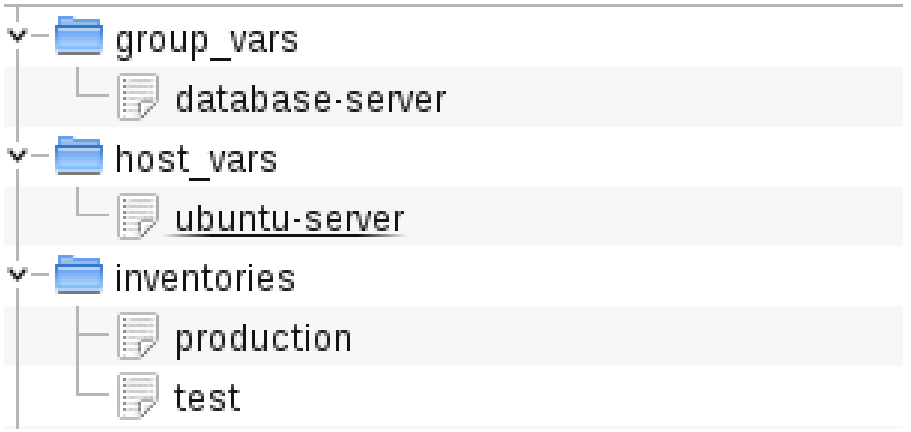
Test

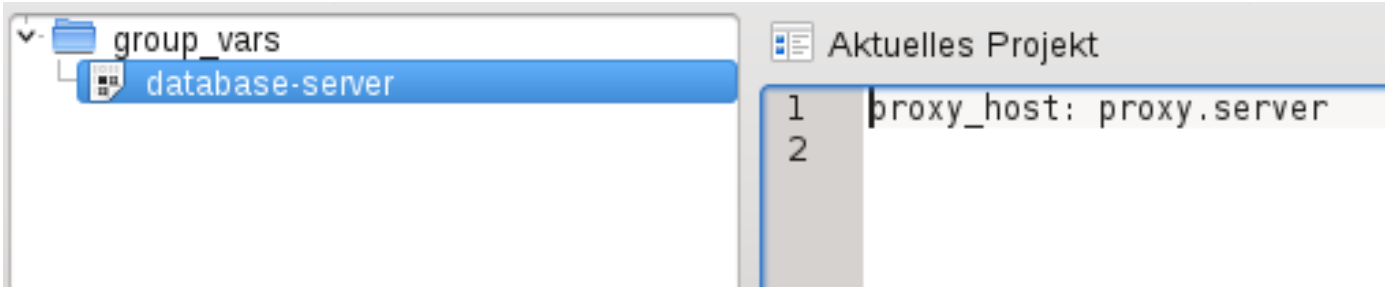
```
[application-server]
192.168.33.10

[database-server]
192.168.33.10

```

Inventories





```
    apt: name=openjdk-8-jdk state=present
    become: yes
    become_method: sudo

  - name: Download current Tomcat 8 version
    local_action: get_url url="http://archive.apache.org/dist/tomcat/tomcat-8/v{{
    tomcat_version }}/bin/{{ tomcat_base_name }}.tar.gz" dest=/tmp

  - name:
    file: name=/opt mode=777
    become: yes
    become_method: sudo

  - name: Install Tomcat 8
    unarchive: src=/tmp/{{ tomcat_base_name }}.tar.gz dest=/opt creates=/opt/{{
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  - name: Set link to tomcat 8
    file: src=/opt/{{ tomcat_base_name }} dest=/opt/tomcat  state=link force=yes

  - name: setup setenv.sh
    template: dest="/opt/{{ tomcat_base_name }}/bin/setenv.sh"
    src="roles/tomcat8/templates/setenv.sh.j2" mode=755
    when: catalina_opts is defined

  - find: paths="/opt/{{ tomcat_base_name }}/bin" patterns="*.sh"
    register: result

  - name: ensure tomcat scripts are executable
    file: name={{item.path}} mode=755
    with_items: '{{ result.files }}'

  - name: install init.d script for tomcat
    copy: src=roles/tomcat8/files/init.d/tomcat dest=/etc/init.d/tomcat owner=vagrant
    group=vagrant mode=755
    become: yes
    become_method: sudo
```

Templates

- setenv.sh.j2

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

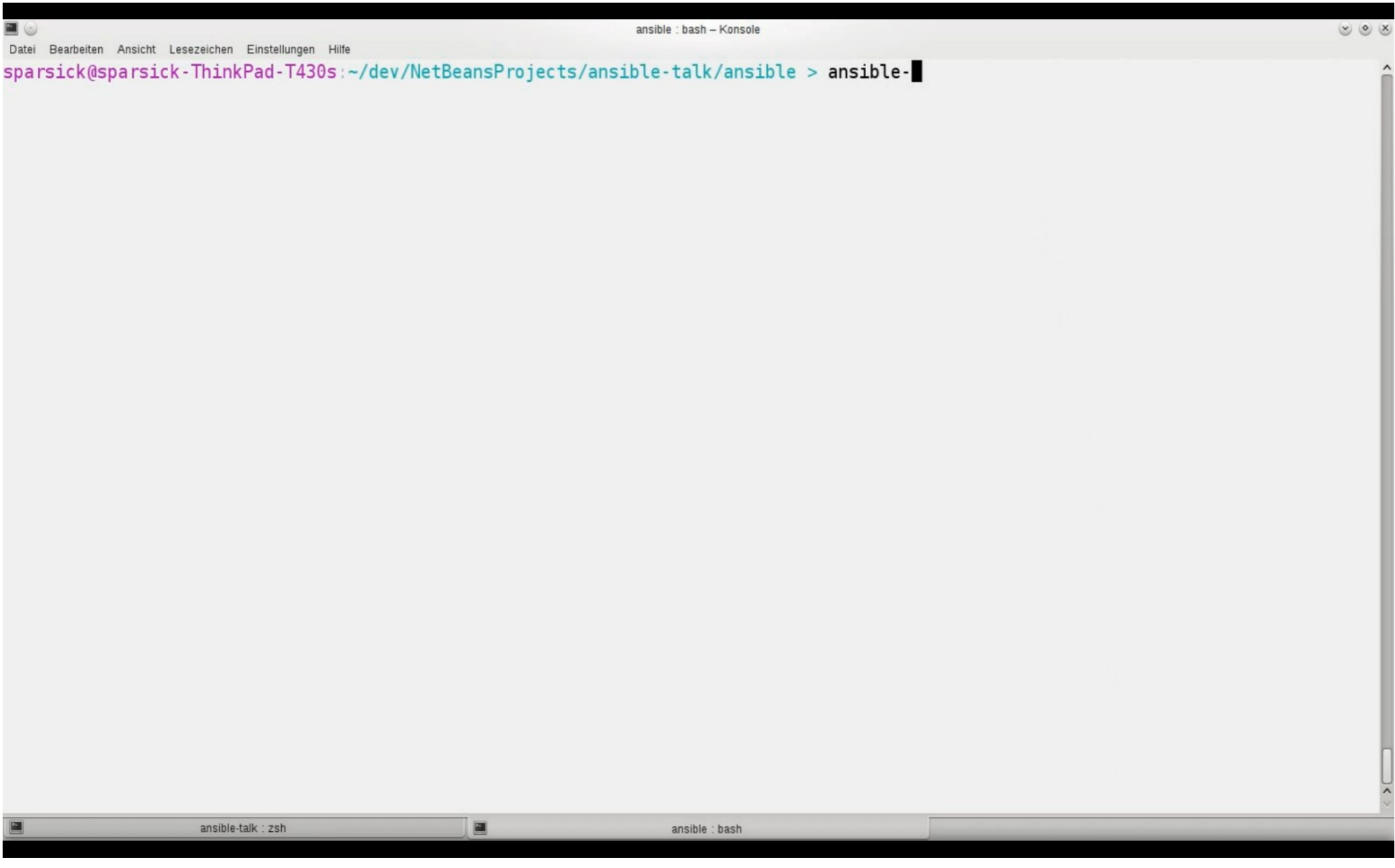
Templates - Jinja2

- Templating engine für Python

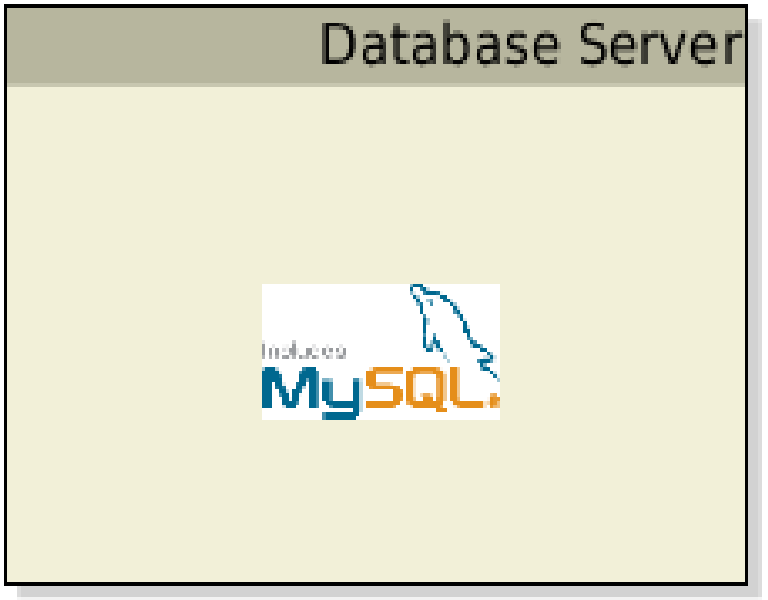
```
<title>{% block title %}{% endblock %}</title>
<ul>
{% for user in users %}
  <li><a href="{{ user.url }}">{{ user.username }}</a></li>
{% endfor %}
</ul>
```

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

Setup Application Server Playbook

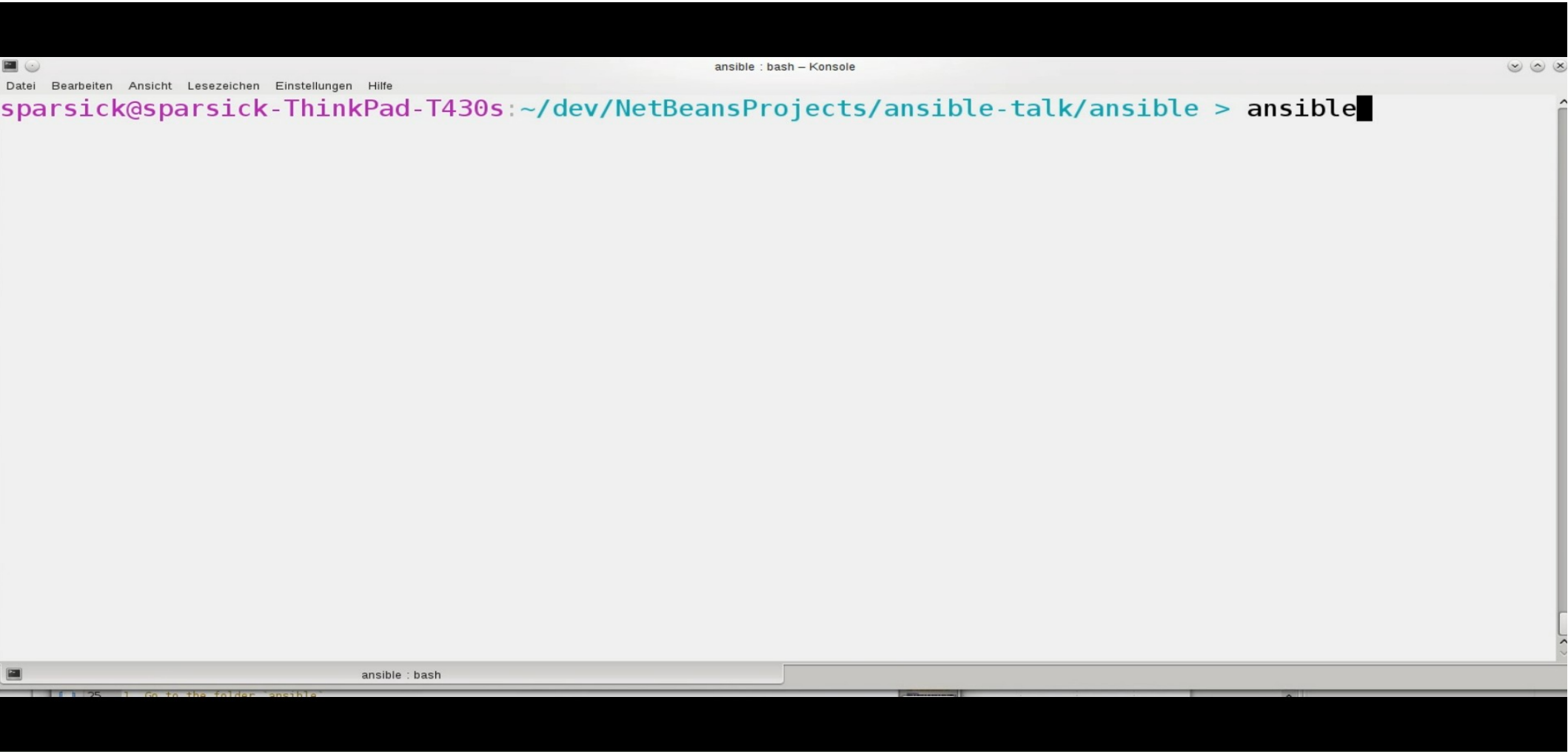


Setup Database Server Playbook

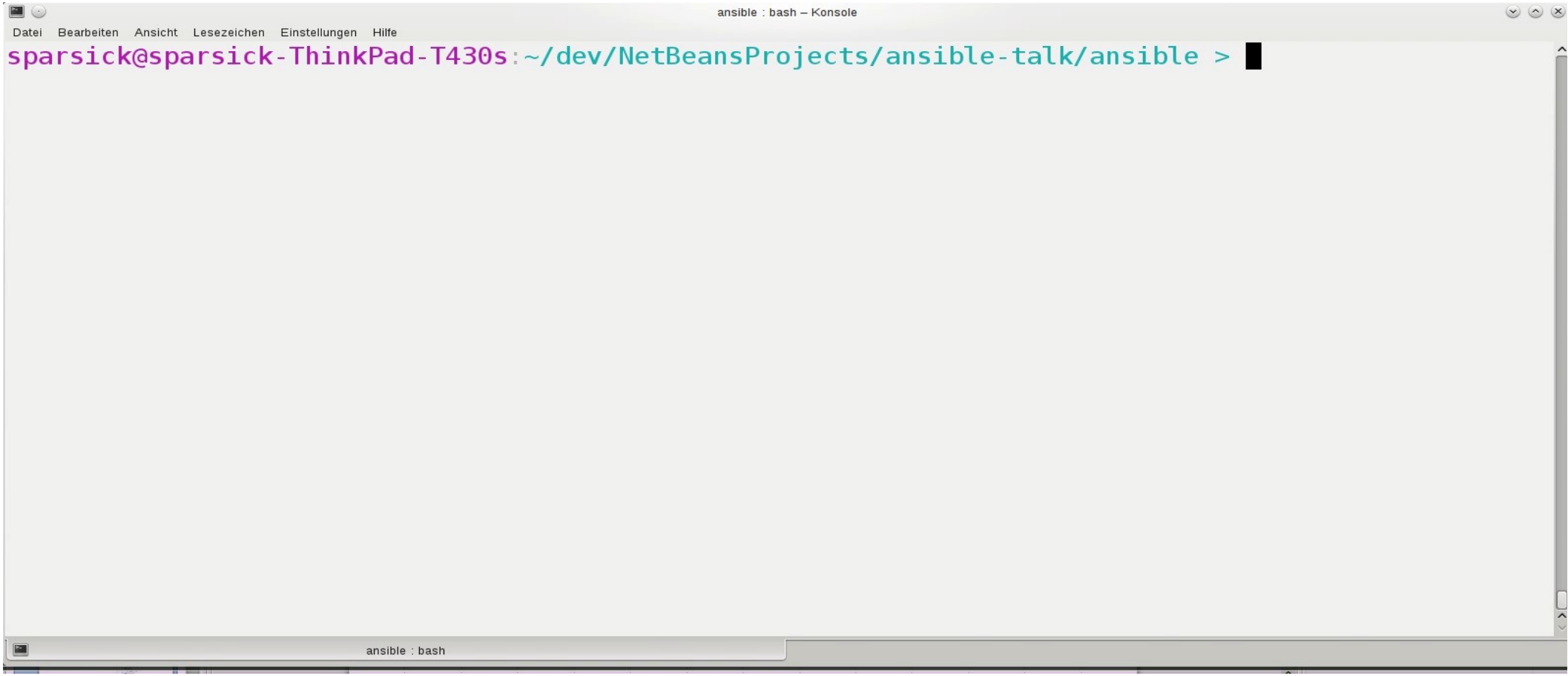


```
1  - hosts: database-server
2    become: yes
3    become_method: sudo
4
5    tasks:
6      - name: install mysql db
7        apt: name=mysql-server state=present
8
9      - name: installs python-mysqldb
10       apt: name=python-mysqldb state=present
11
12     - name: start mysql
13       service: 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=g3h31m priv=*.*:ALL,GRANT state=present host=%
24
25   handlers:
26      - name: restart mysql
27        service: name=mysql state=restarted
```

Setup Database Server Playbook



Setup Database Server Playbook



```yaml
- hosts: application-server
  vars:
    tomcat_version: 8.5.8
    tomcat_base_name: apache-tomcat-{{ tomcat_version }}
    #catalina_opts: "-Dkey=value"

  tasks:
    - name: install java
      apt: name=openjdk-8-jdk state=present
      become: yes
      become_method: sudo

    - name: Download current Tomcat 8 version
      local_action: get_url url="http://archive.apache.org/dist/tomcat/tomcat-8/v{{ tomcat_version }}/bin/{{ tomcat_base_name }}.tar.gz" dest=/tmp

    - name:
      file: name=/opt mode=777
      become: yes
      become_method: sudo

    - name: Install Tomcat 8
      unarchive: src=/tmp/{{ tomcat_base_name }}.tar.gz dest=/opt creates=/opt/{{ tomcat_base_name }} owner=vagrant group=vagrant

    - name: Set link to tomcat 8
      file: src=/opt/{{ tomcat_base_name }} dest=/opt/tomcat  state=link force=yes

    - name: setup setenv.sh
      template: dest="/opt/{{ tomcat_base_name }}/bin/setenv.sh" src="roles/tomcat8/templates/setenv.sh.j2" mode=755
      when: catalina_opts is defined

    - find: paths="/opt/{{ tomcat_base_name }}/bin" patterns="*.sh"
      register: result

    - name: ensure tomcat scripts are executable
      file: name={{item.path}} mode=755
```

```
    apt: name=openjdk-8-jdk state=present
    become: yes
    become_method: sudo

  - name: Download current Tomcat 8 version
    local_action: get_url url="http://archive.apache.org/dist/tomcat/tomcat-8/v{{
    tomcat_version }}/bin/{{ tomcat_base_name }}.tar.gz" dest=/tmp

  - name:
    file: name=/opt mode=777
    become: yes
    become_method: sudo

  - name: Install Tomcat 8
    unarchive: src=/tmp/{{ tomcat_base_name }}.tar.gz dest=/opt creates=/opt/{{
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    file: src=/opt/{{ tomcat_base_name }} dest=/opt/tomcat  state=link force=yes

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    src="roles/tomcat8/templates/setenv.sh.j2" mode=755
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  - find: paths="/opt/{{ tomcat_base_name }}/bin" patterns="*.sh"
    register: result

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    file: name={{item.path}} mode=755
    with_items: '{{ result.files }}'

  - name: install init.d script for tomcat
    copy: src=roles/tomcat8/files/init.d/tomcat dest=/etc/init.d/tomcat owner=vagrant
    group=vagrant mode=755
    become: yes
    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
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15     - name: set bind address
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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=g3h31m priv=*.*:ALL,GRANT state=present host=%
24
25   handlers:
26      - name: restart mysql
27        service: name=mysql state=restarted
```
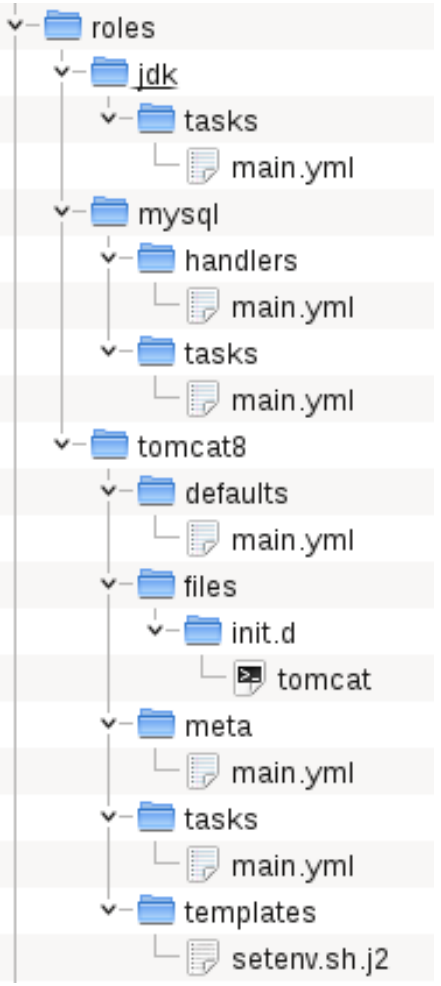

Roles

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



Setup Playbooks mit Roles

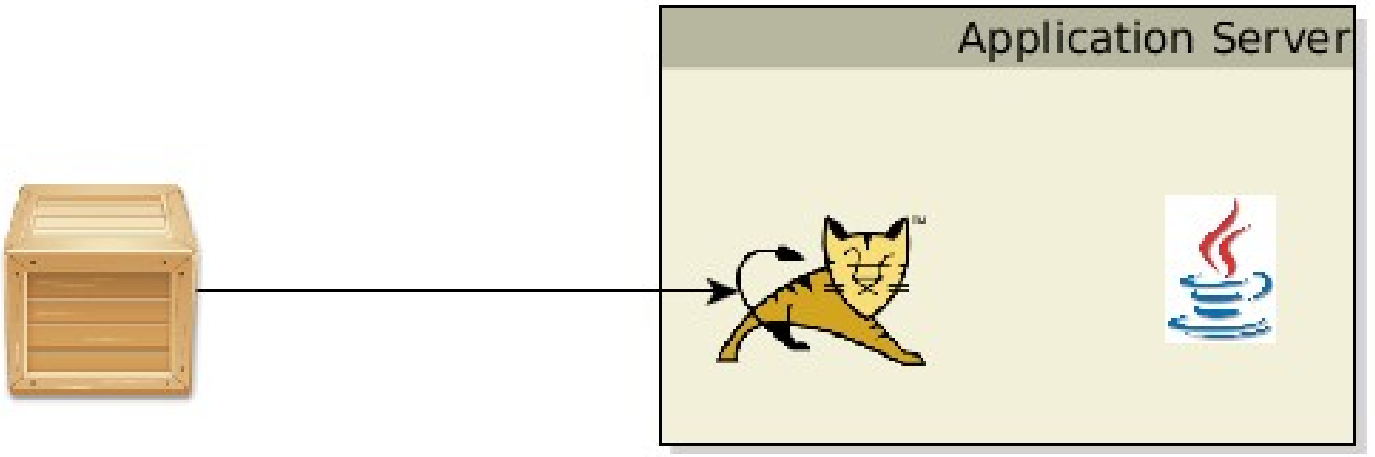
- Setup Application Server

```
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
```

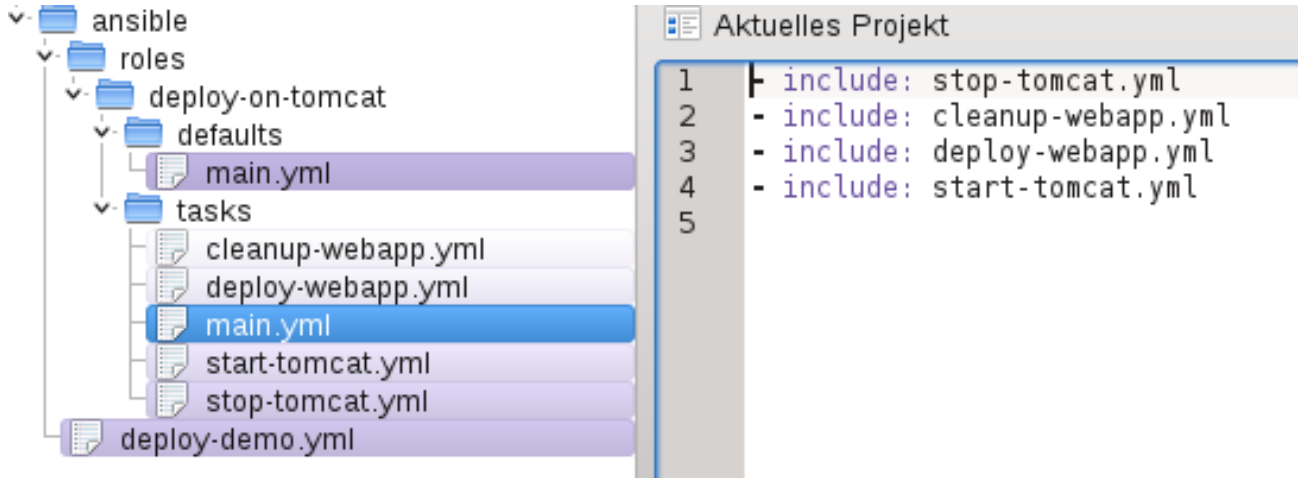
Java Webapplikation Deployment



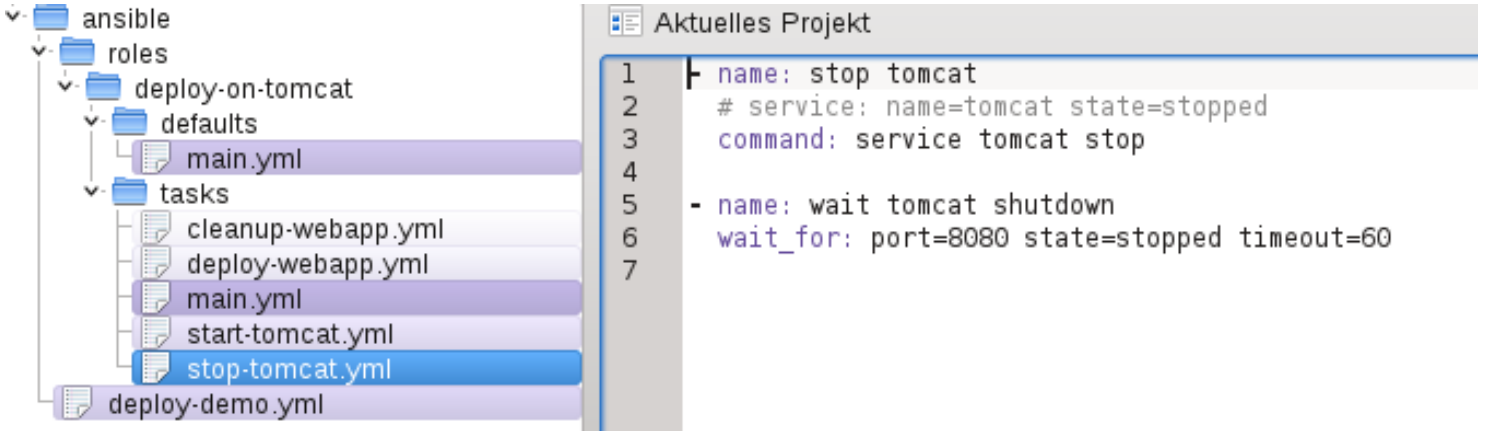
Deploy Application Playbook

```
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 }
```

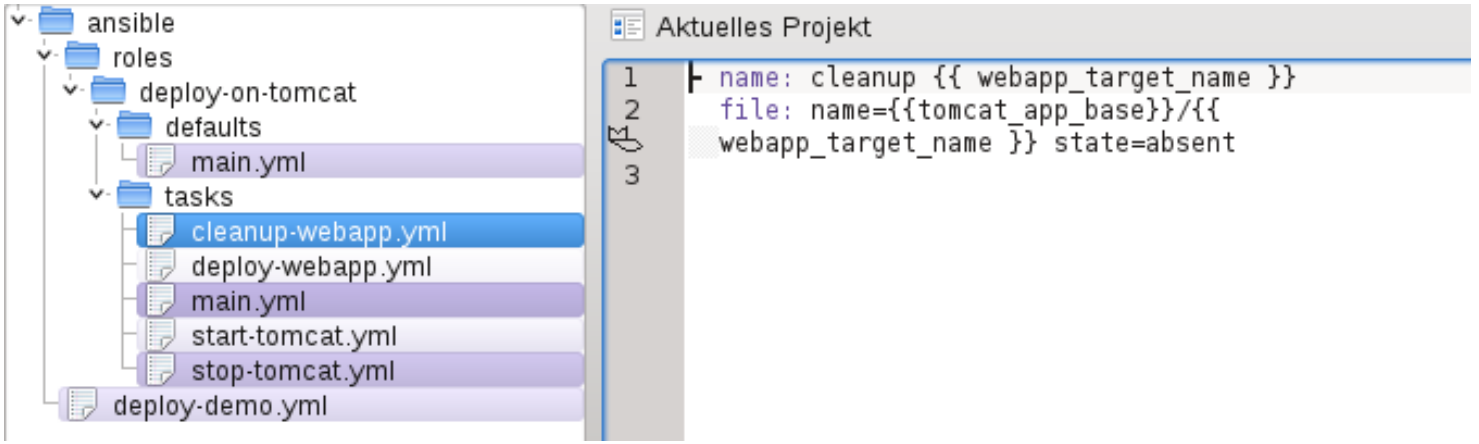
deploy-on-tomcat Role



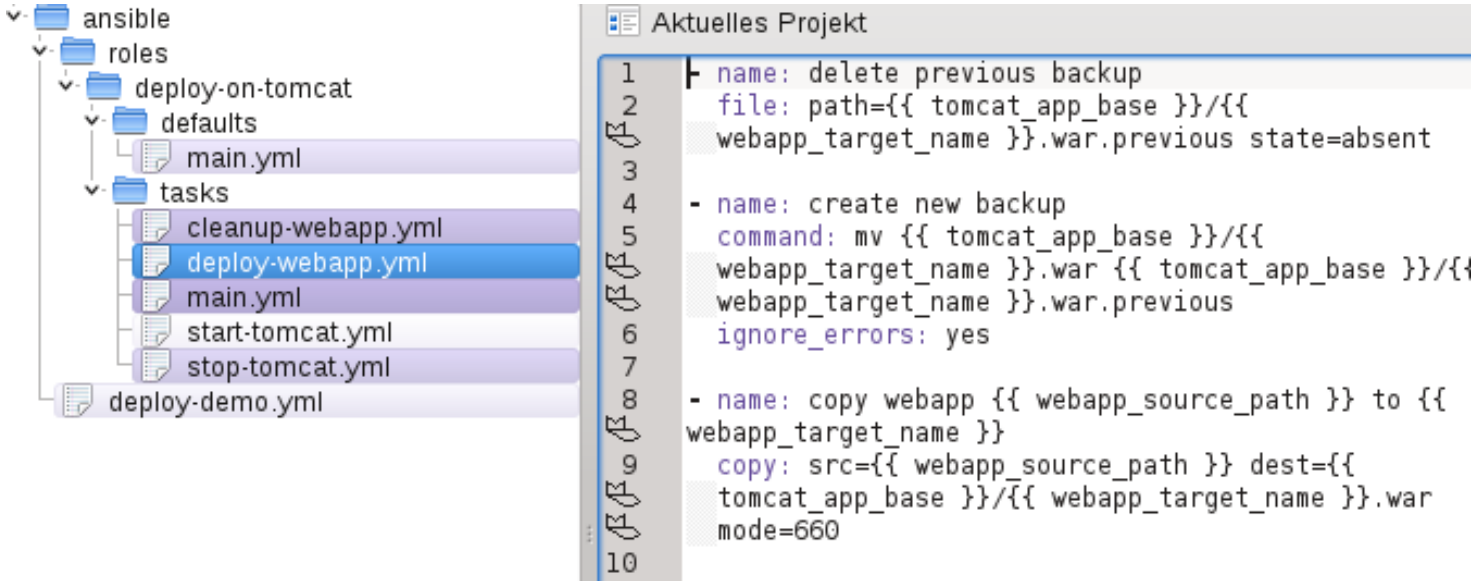
deploy-on-tomcat Role



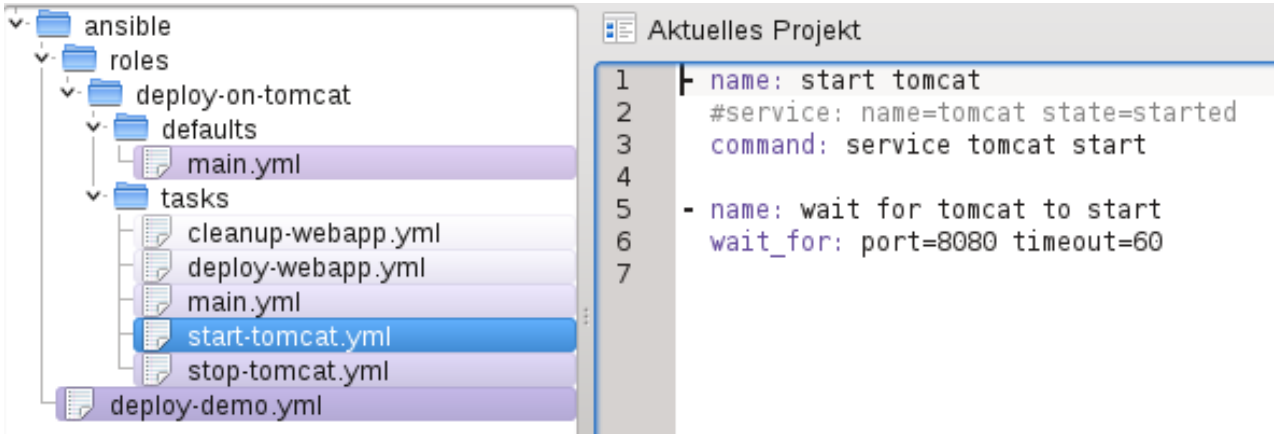
deploy-on-tomcat Role



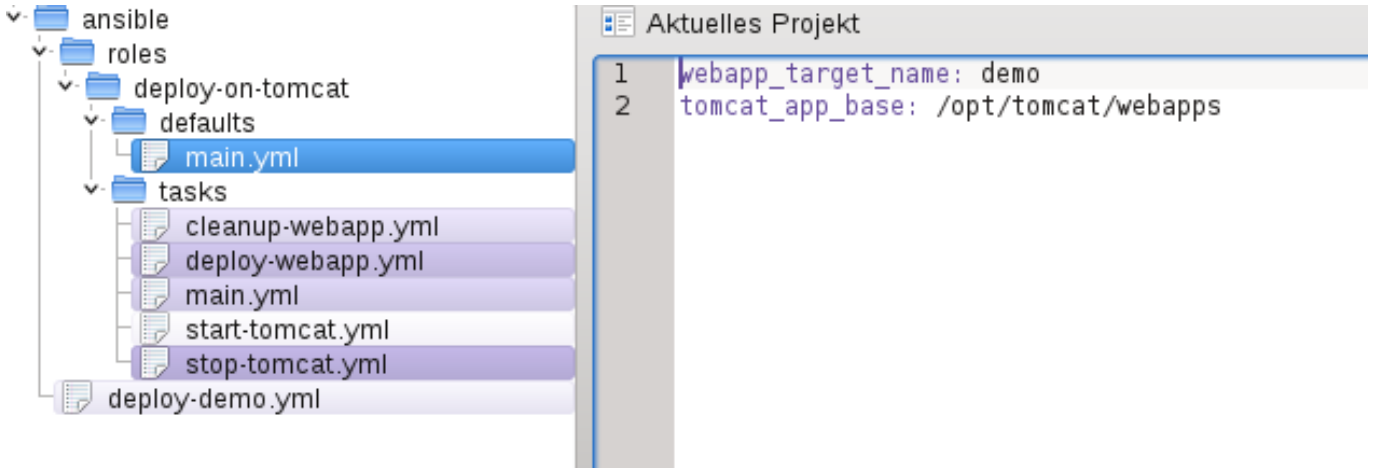
deploy-on-tomcat Role



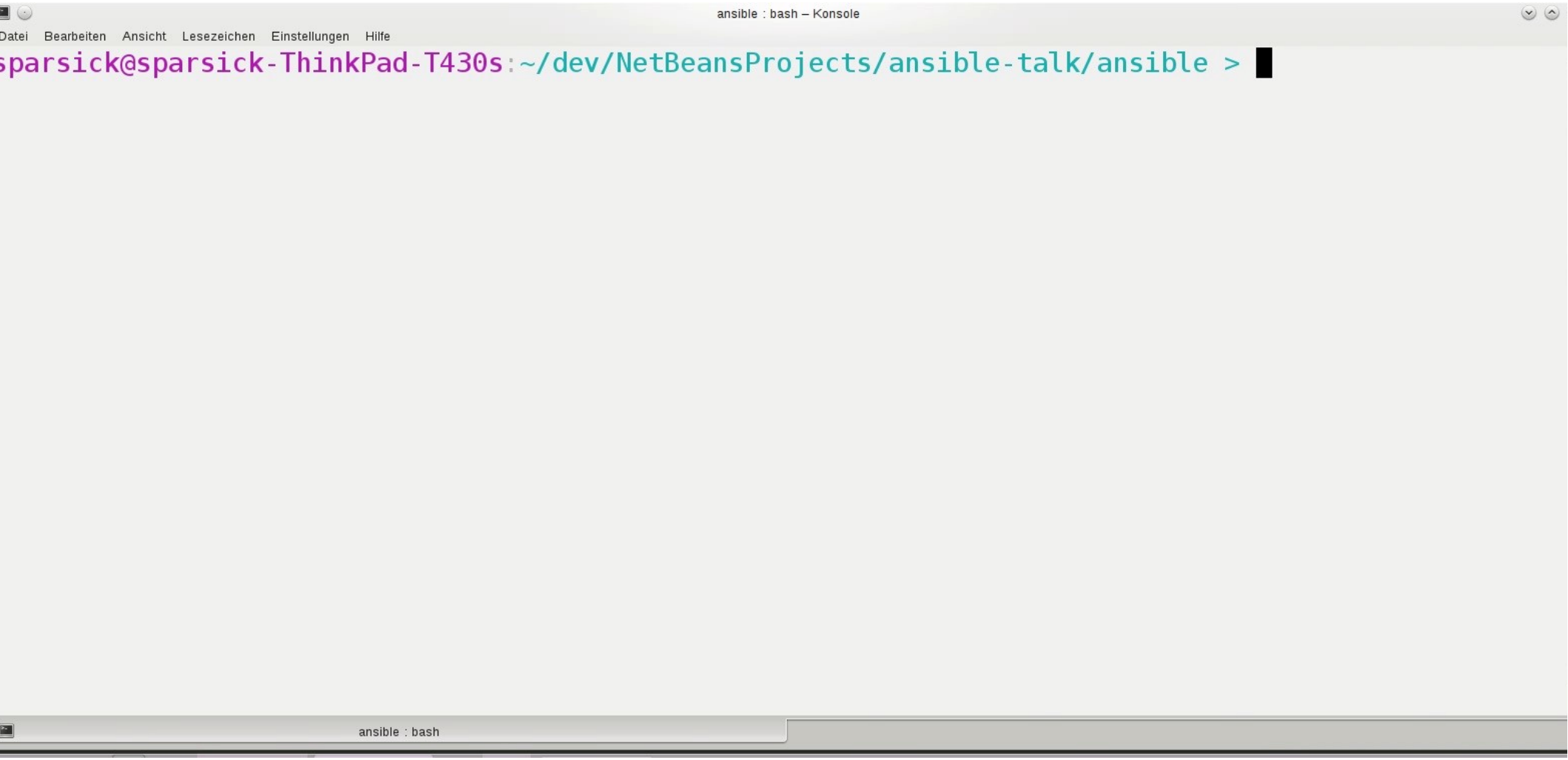
deploy-on-tomcat Role



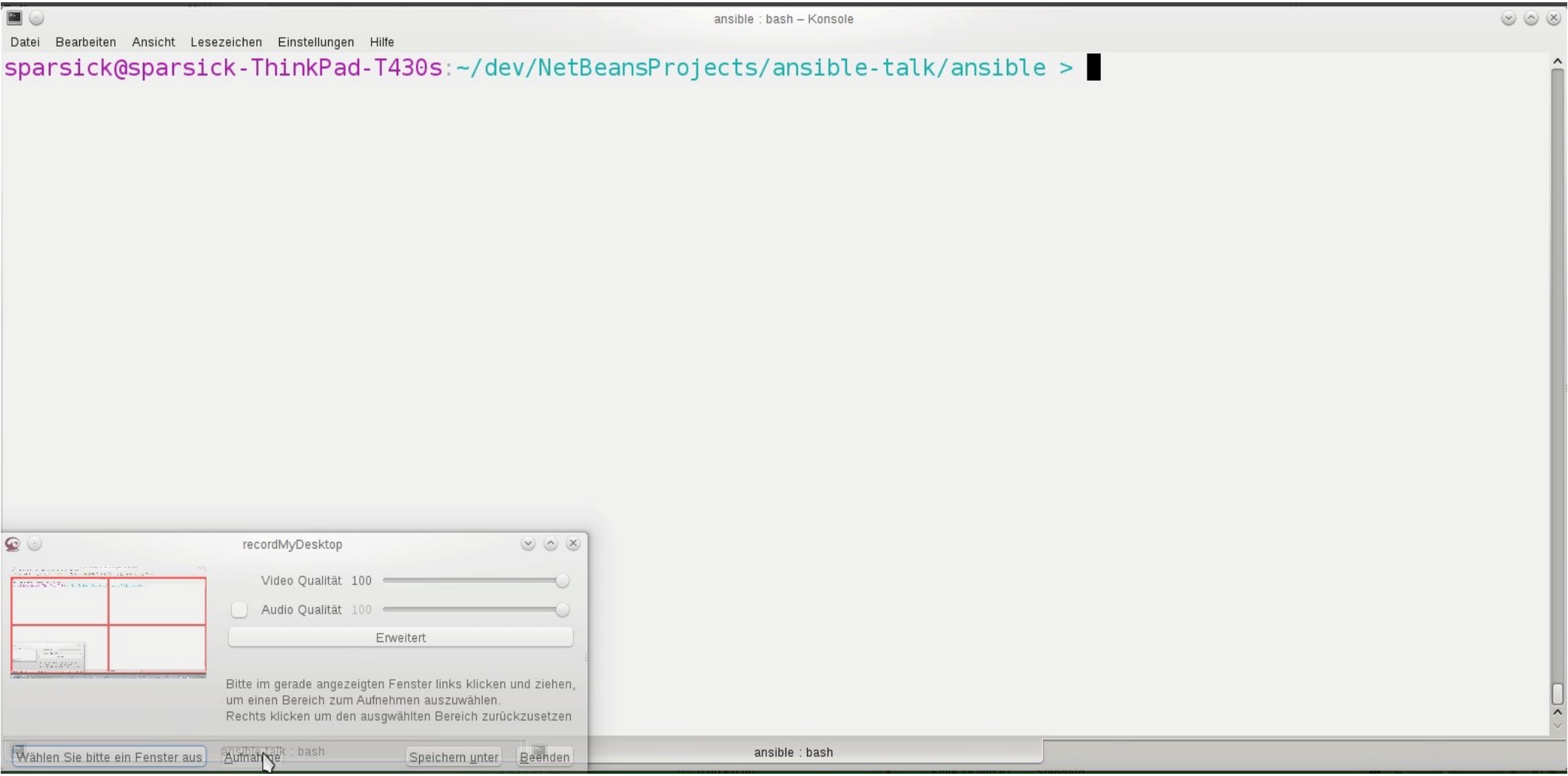
deploy-on-tomcat Role



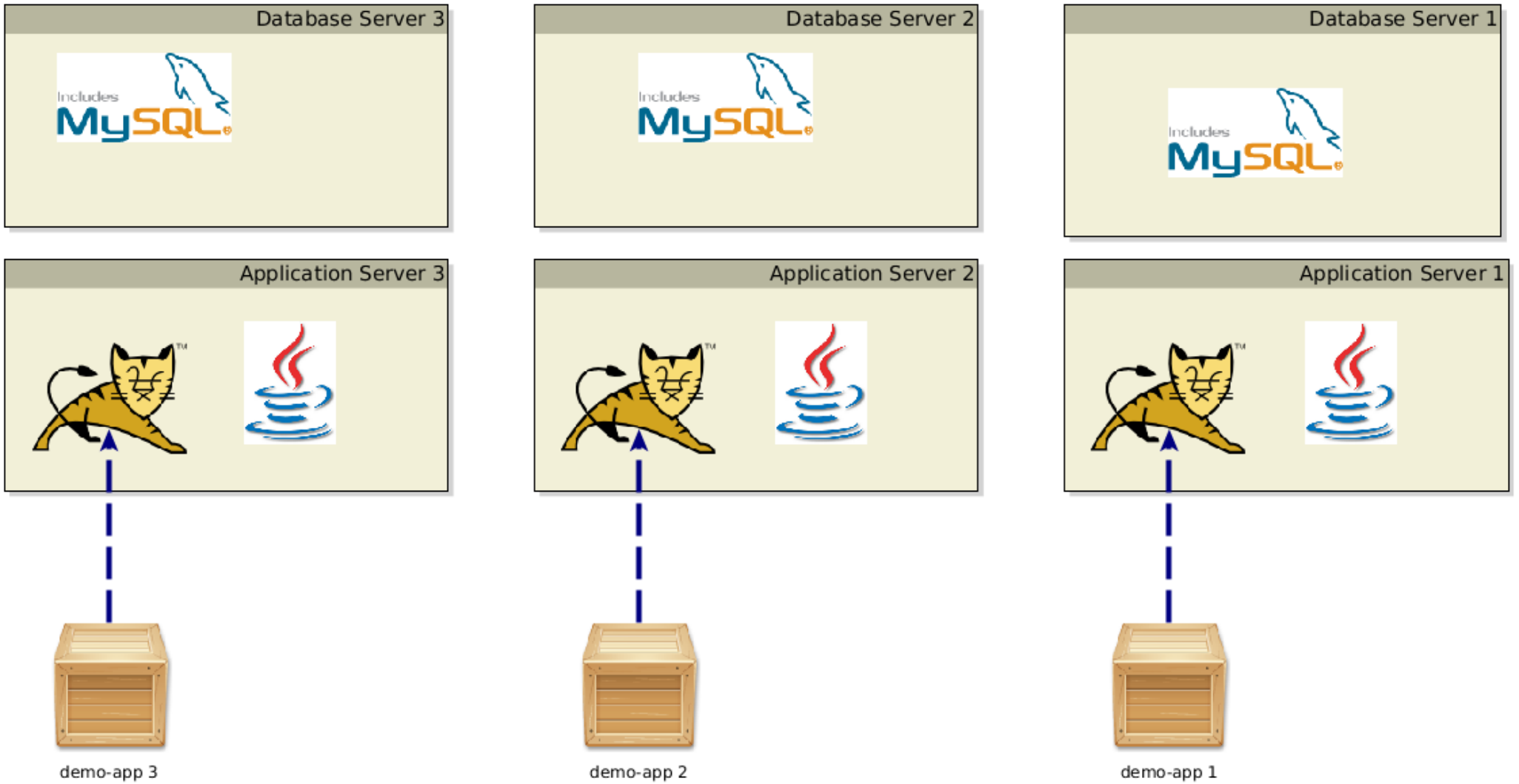
Deploy Application Playbook



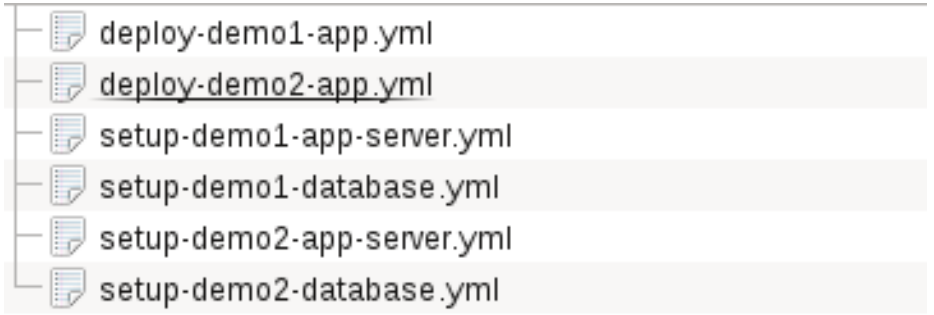
Ad-hoc-Kommando



Warum Roles?


Database Server 3
Includes MySQL
Database Server 2
Includes MySQL
Database Server 1
Includes MySQL
Application Server 3
Application Server 2
Application Server 1
demo-app 3
demo-app 2
demo-app 1

Warum Roles?

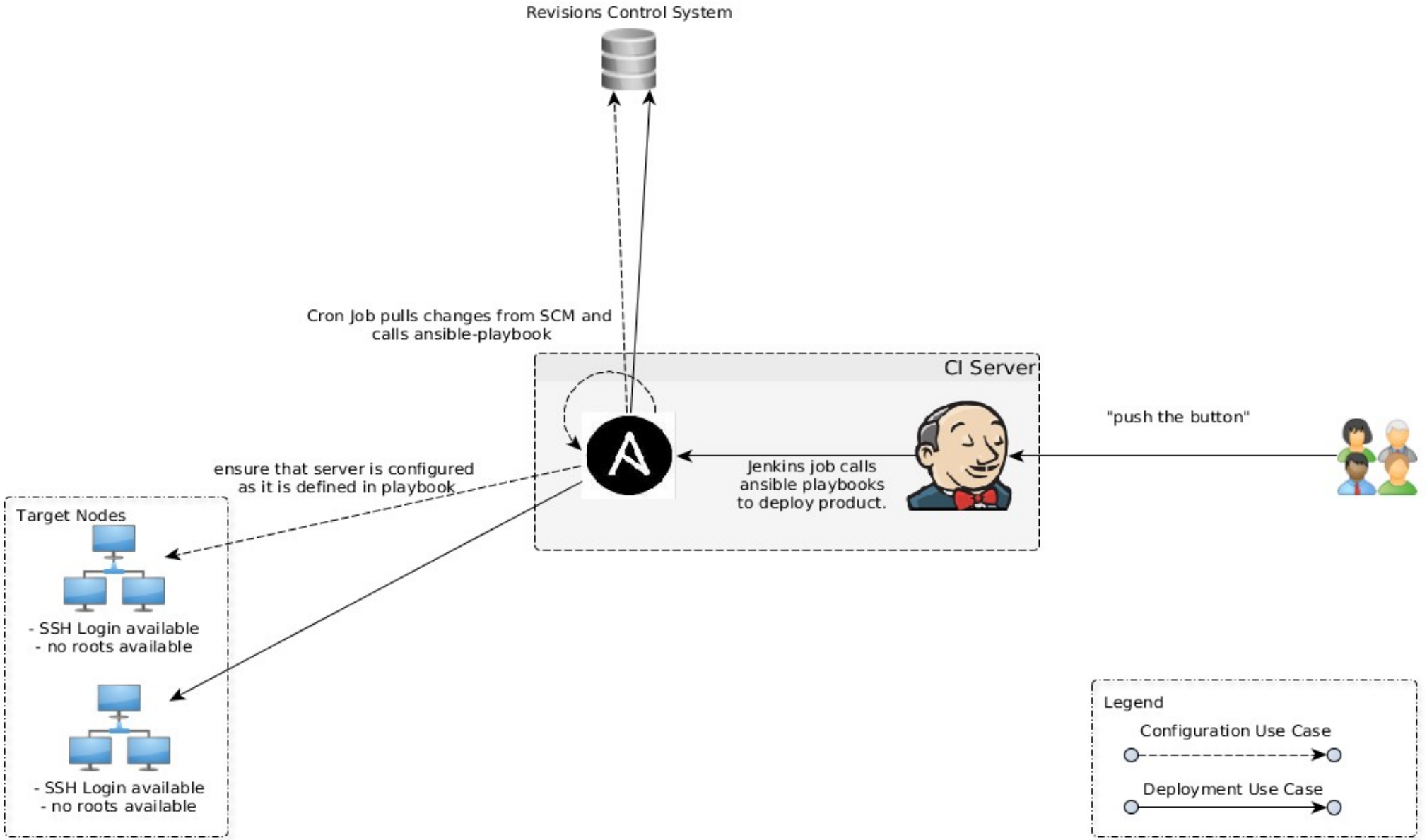

deploy-demo1-app.yml
deploy-demo2-app.yml
setup-demo1-app-server.yml
setup-demo1-database.yml
setup-demo2-app-server.yml
setup-demo2-database.yml

Warum Roles?

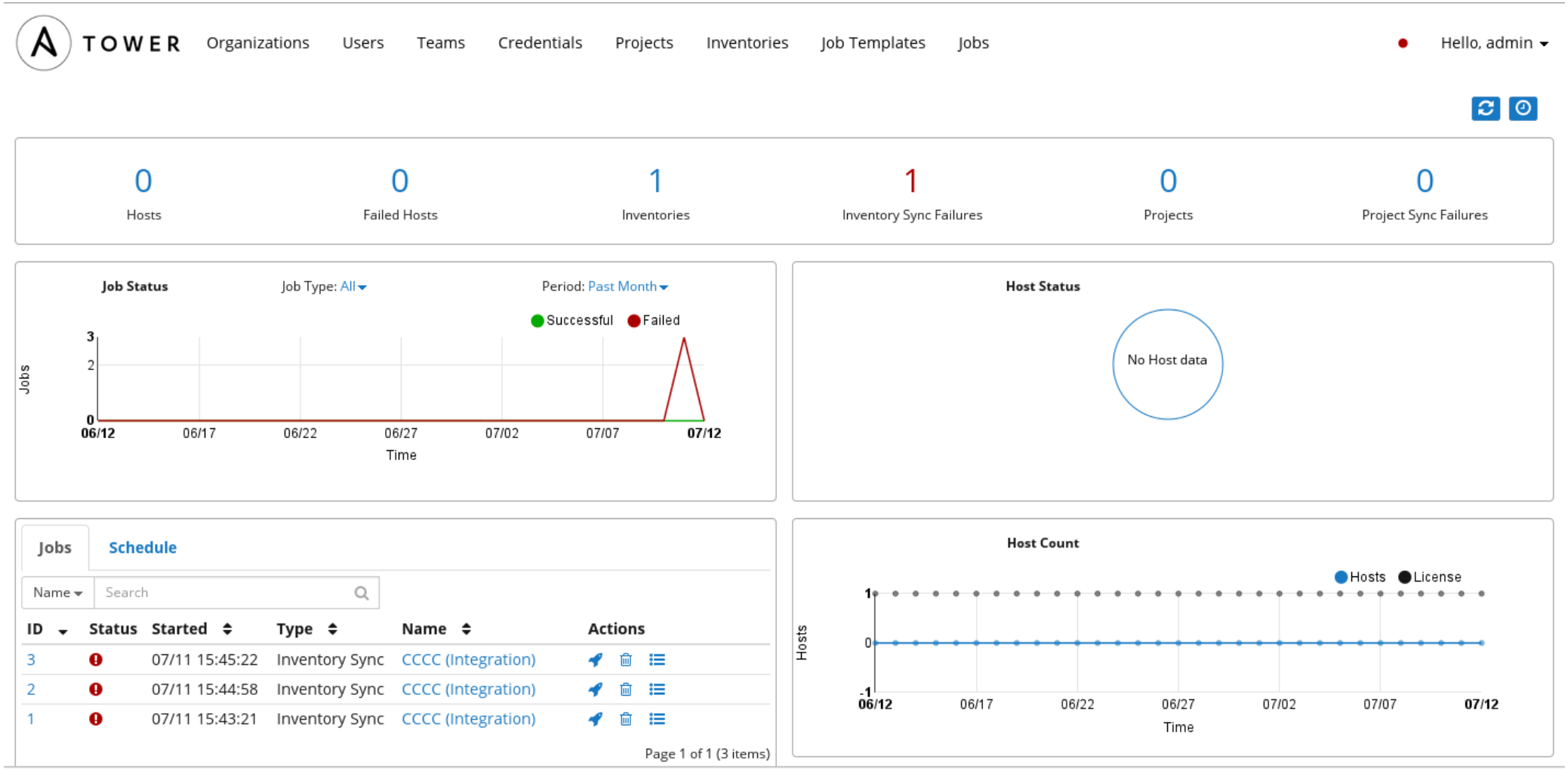
```
1  - hosts: demo1-application-server
2    roles:
3      - {role: deploy-on-tomcat, webapp_source_path: ./demo1-1.0-
       SNAPSHOT.war, webapp_target_name: demo1 }
4
```

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

Ansible Infrastruktur



Ansible Tower



Weitere Features

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

Wie werden Ansible Skripte getestet?

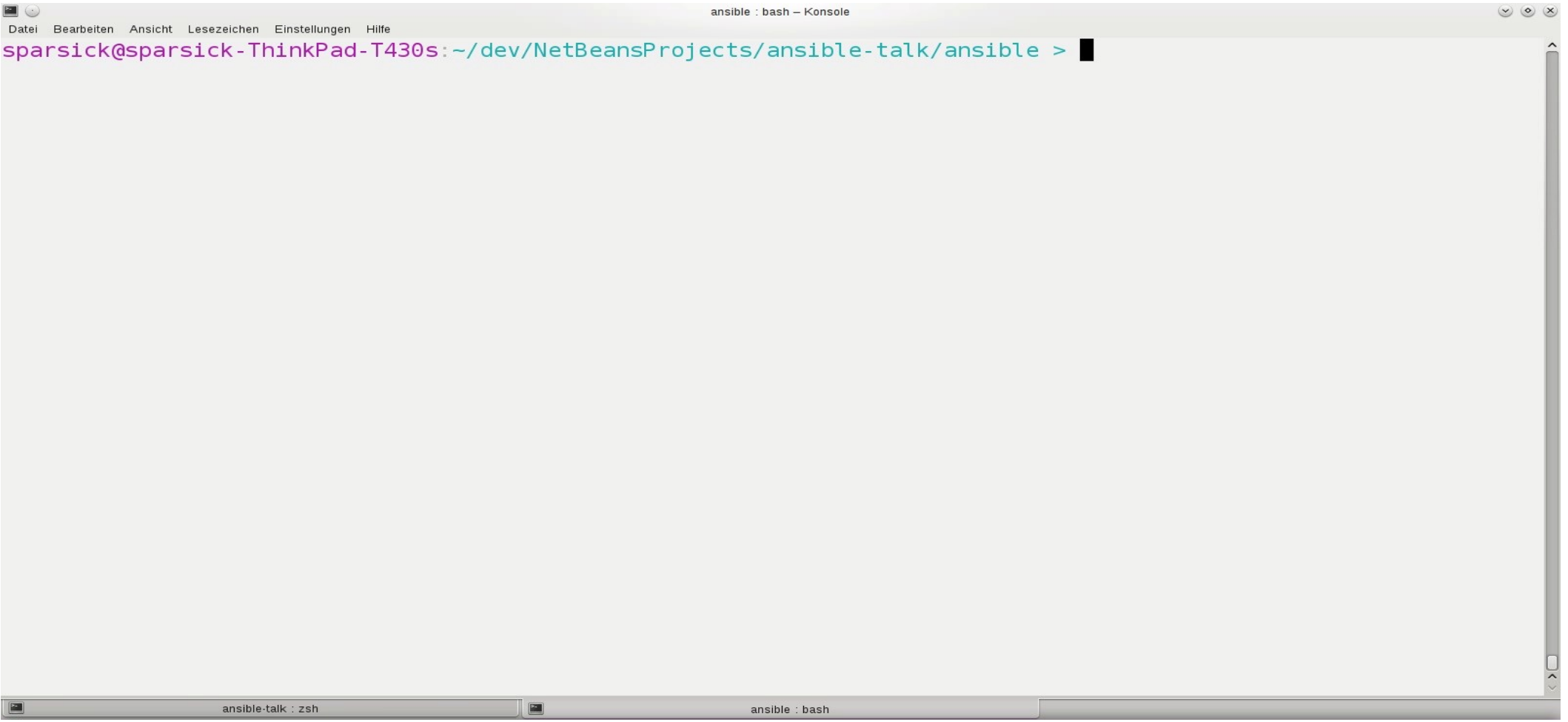
- `ansible-playbook --check`
- `ansible-playbook --syntax-check`
- Jenkins + Vagrant
- Rspec tests

ServerSpec Tests

```
require 'spec_helper'

describe package('mysql-server') do
  it { should be_installed }
end

describe service('mysql') do
  it { should be_enabled   }
  it { should be_running   }
end

describe 'MySQL config parameters' do
  context mysql_config('bind-address') do
    its(:value) { should eq '0.0.0.0' }
  end
end

```

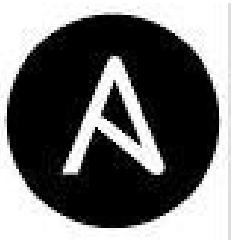
```
require 'spec_helper'

describe package('openjdk-8-jdk') do
  it { should be_installed }
end

describe command('ls /etc/init.d/tomcat') do
  its(:exit_status) { should eq 0 }
end

describe command('ls /opt/tomcat') do
  its(:exit_status) { should eq 0 }
end
```

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

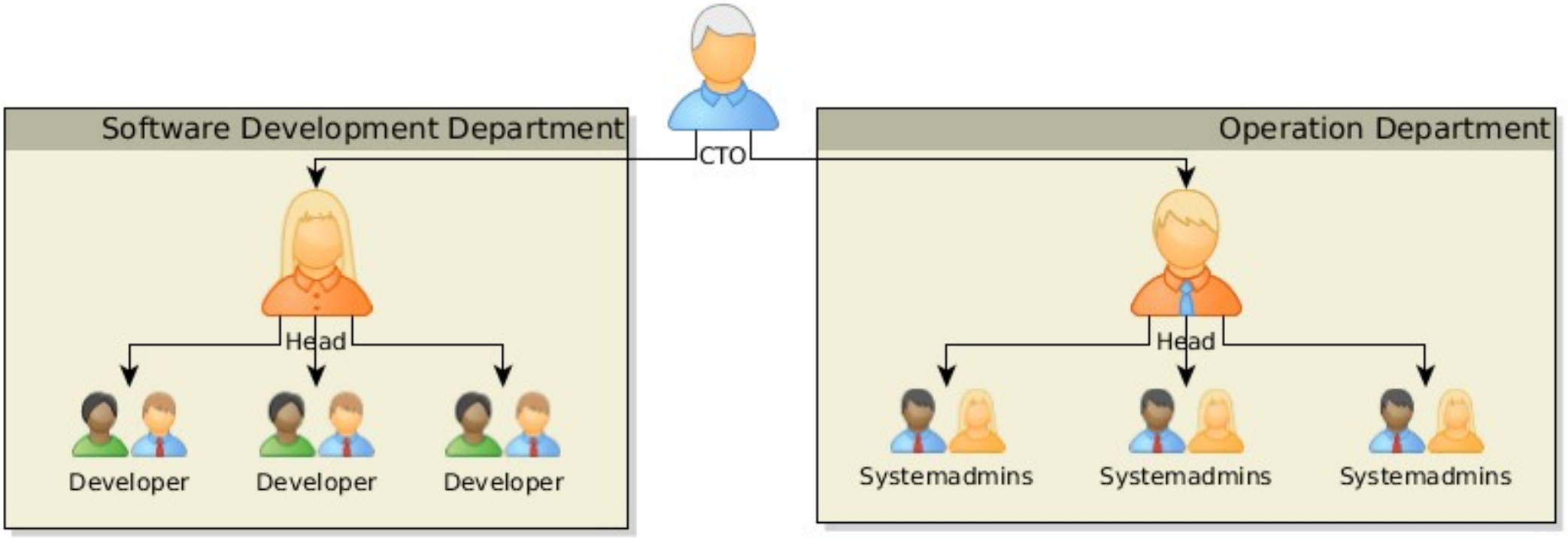

```
- name: add nodejs ppa
  apt_repository: repo='ppa:chris-lea/node.js'

- 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

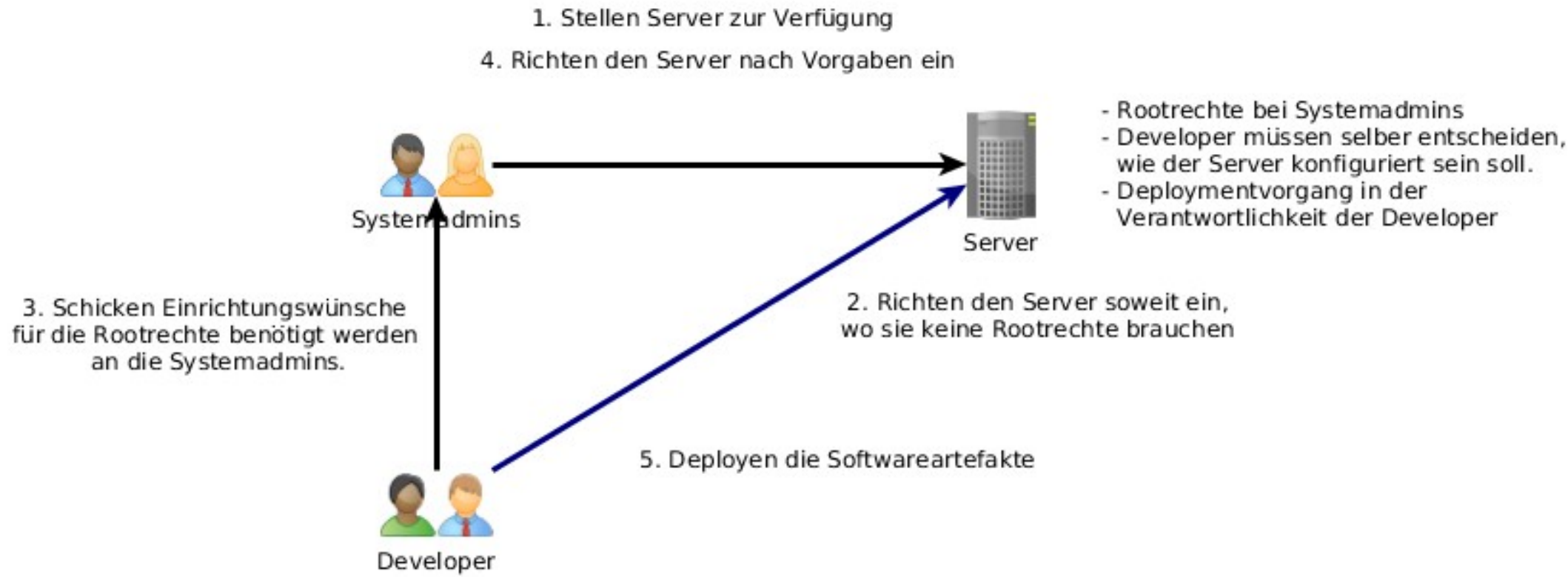
Systemkonfiguration für Entwickler

Organisatorische Ausgangslage
Realität



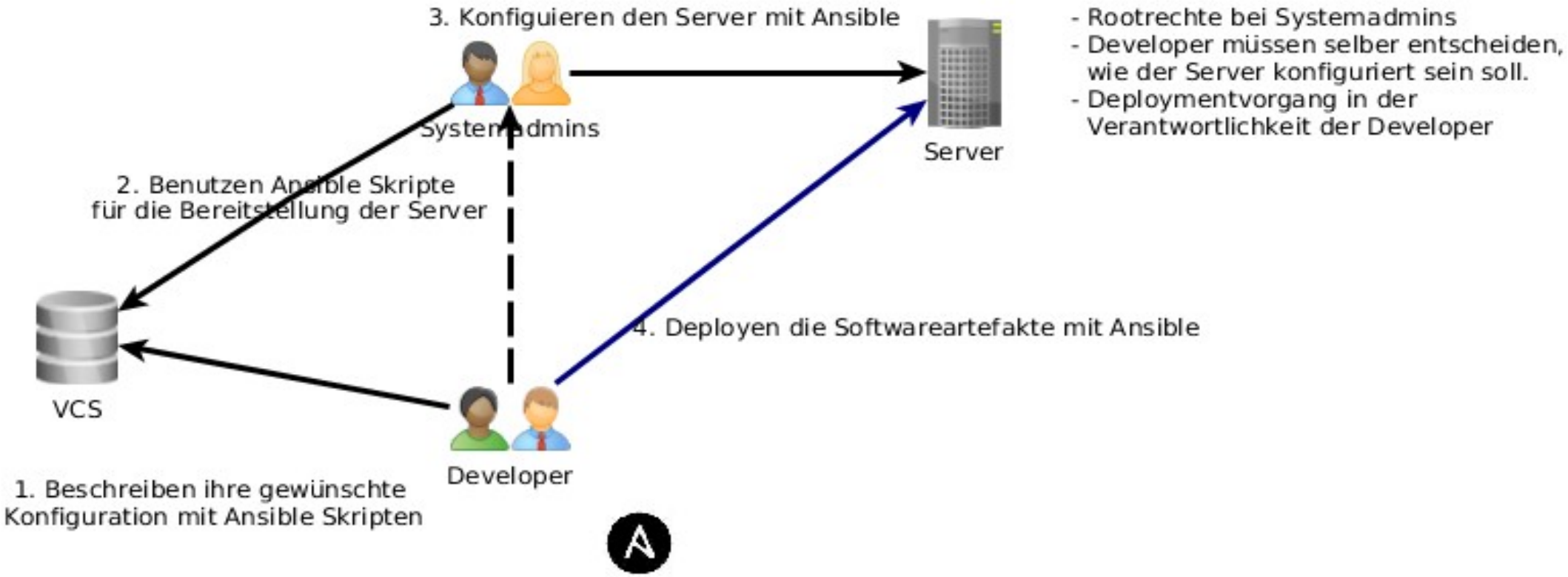
Systemkonfiguration für Entwickler

Prozess zwischen Development und Operation



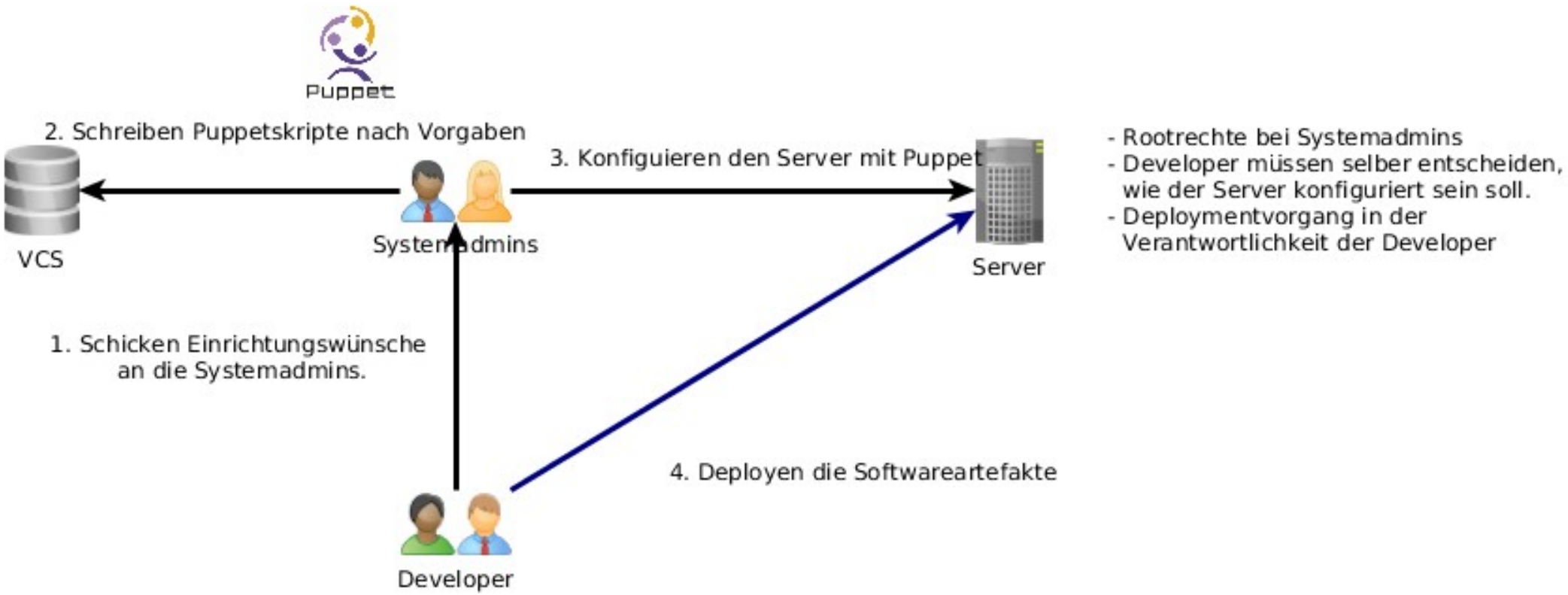
Systemkonfiguration für Entwickler

Lösungidee mit Ansible



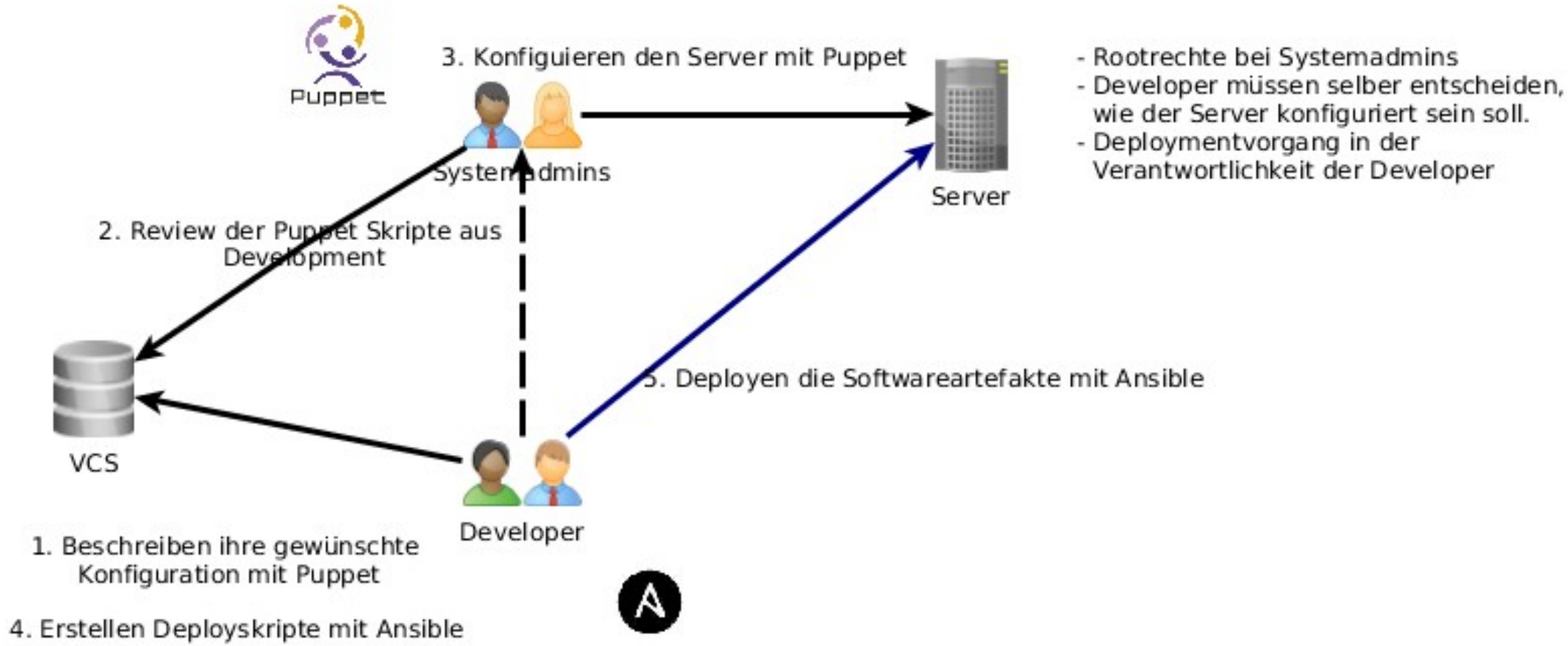
Systemkonfiguration für Entwickler

Variante - Prozess zwischen Development und Operation



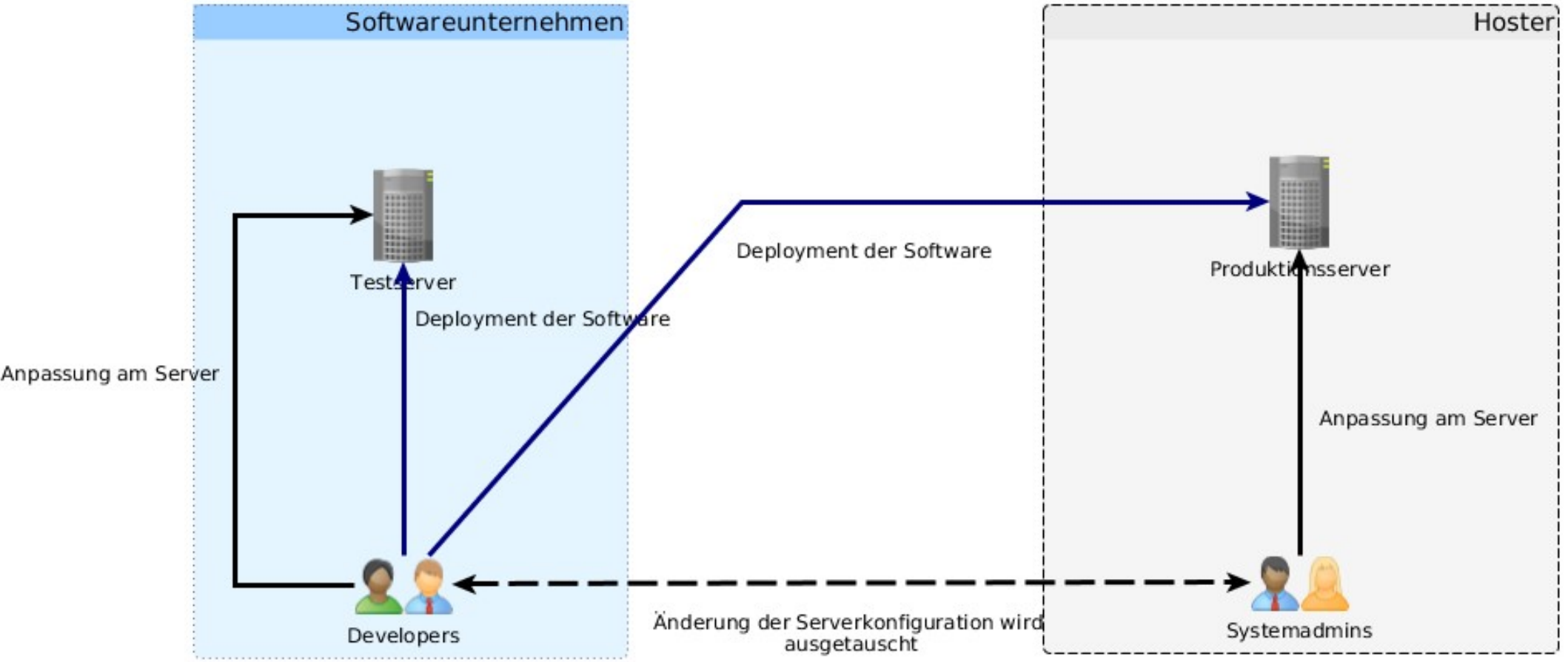
Systemkonfiguration für Entwickler

Lösungsvariante



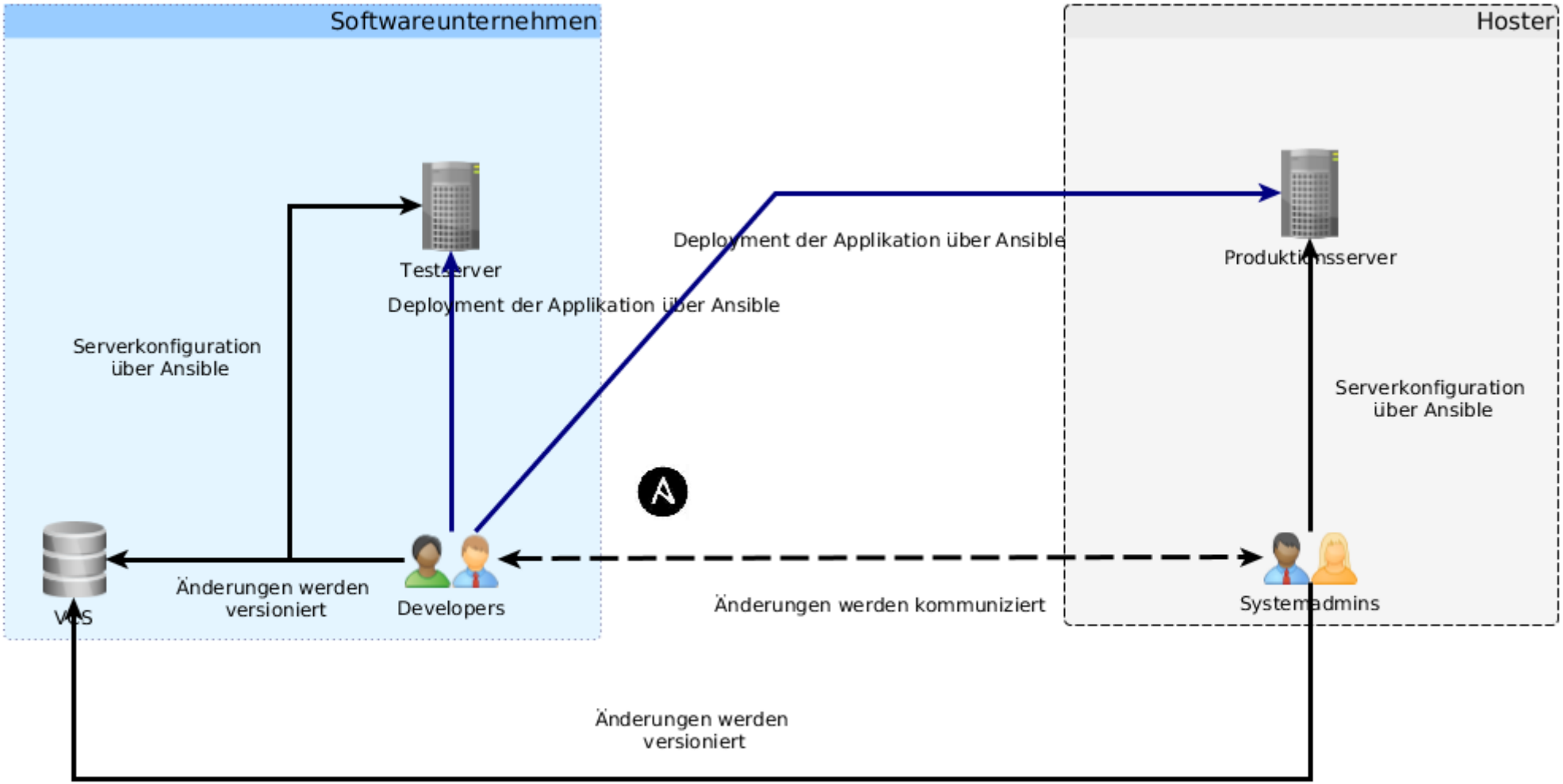
Systemkonfiguration für Entwickler

Produktionsserver sind beim externen Hoster



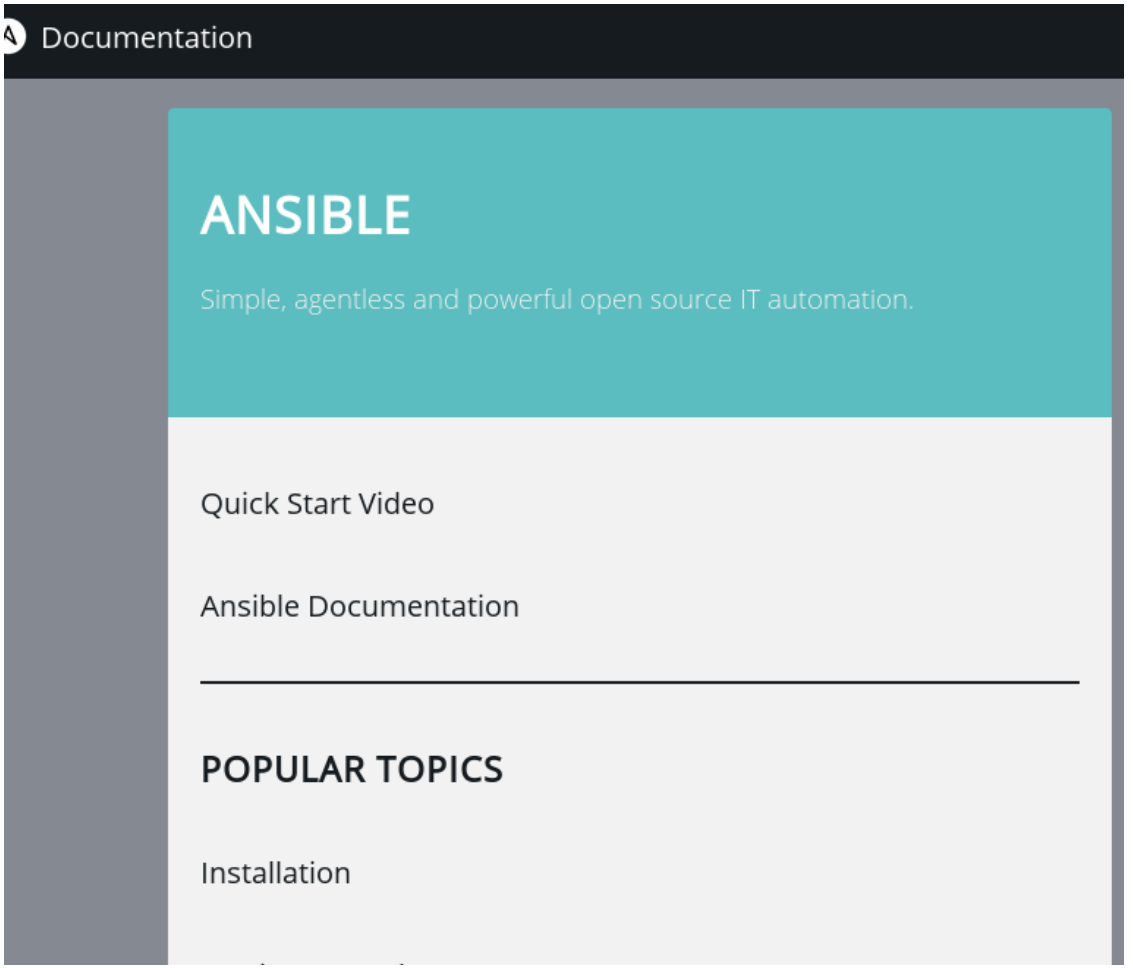
Systemkonfiguration für Entwickler

Lösungsidee



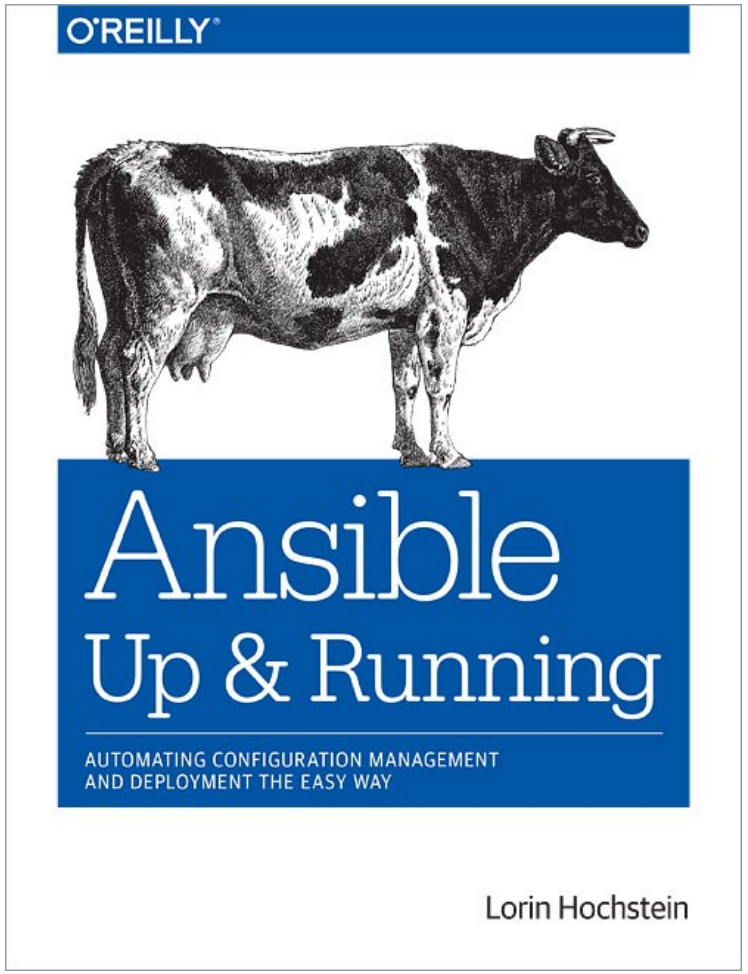
- Hoster verantwortlich für die Systemkonfiguration
- Softwareunternehmen verantwortlich für das Deployment
- Synchronisation zwischen Testserver und Produktionsserver wird vereinfacht

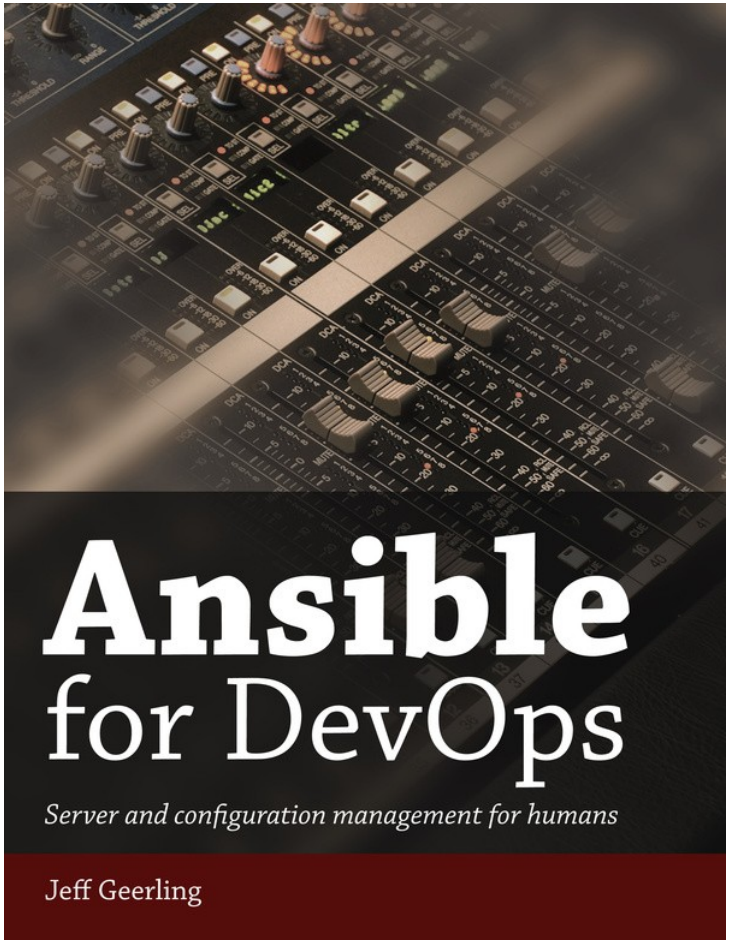
Weitere Informationen



http://docs.ansible.com/

Weitere Informationen





Weitere Informationen

http://bit.ly/2cZ0IrZ

Fragen?

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mail@sandra-parsick.de
https://github.com/sparsick/ansible-talk.git