



Migrating deployment processes and Continuous Integration at SAP SE

to a future-proof design using SLES12, Chef, GitHub, OBS and KIWI

Eike Waldt
Linux Consultant & Trainer
B1 Systems GmbH
waldt@b1-systems.de

Florian Winkler
Linux Consultant & Trainer
B1 Systems GmbH
winkler@b1-systems.de

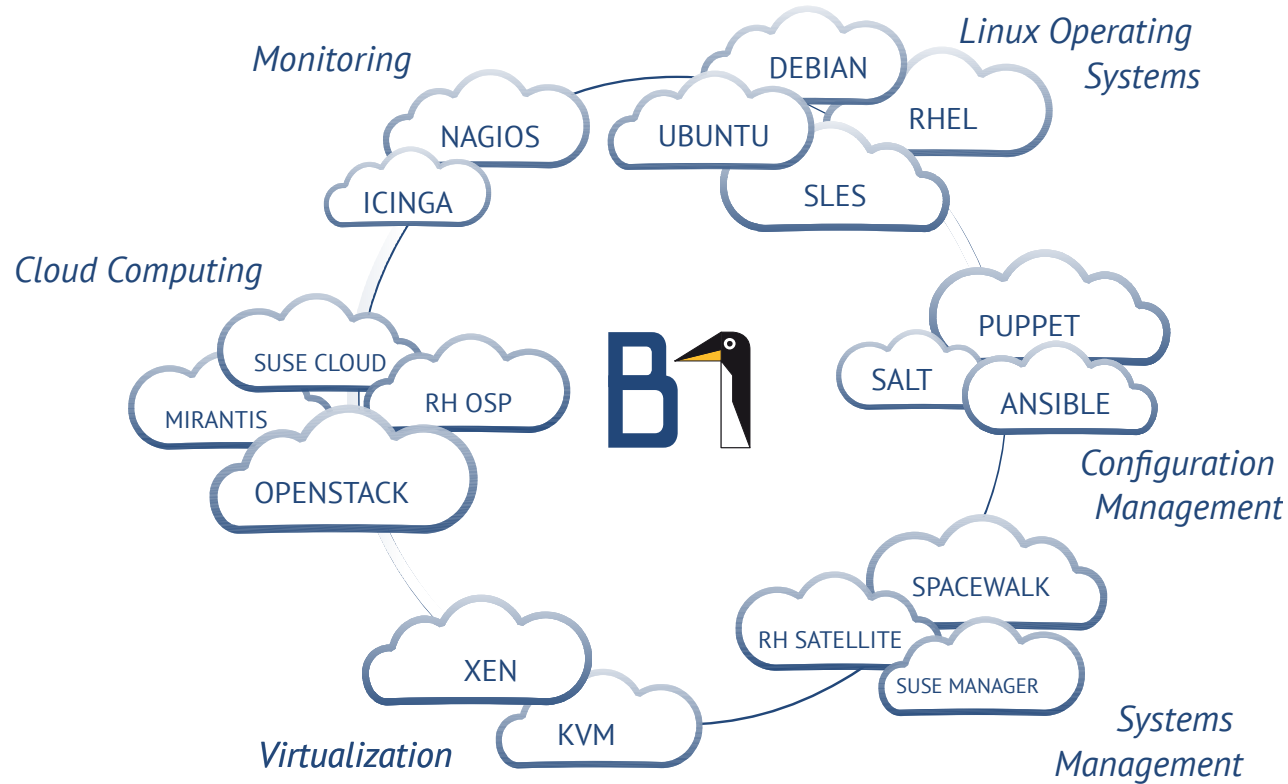
Introduction

Introducing B1 Systems

- founded in 2004
- operating both nationally & internationally
- ~ 100 employees
- vendor-independent (software & hardware)
- SUSE consulting & training partner
- focus:
 - consulting
 - support
 - training
 - development
 - operations
 - solutions



Areas of expertise



Who we are

- Eike Waldt
 - Linux Consultant & Trainer
 - B1 employee since 05/2015
- Florian Winkler
 - Linux Consultant & Trainer
 - B1 employee since 04/2014

Close collaboration of ...



- SaaS Cloud
- HANA Enterprise Cloud



- SAP Managed Service



- SaaS Cloud Managed Services

Agenda

- Motivation and goals
- Software used
- Landscapes and processes
- GMP - Global Management Portal
- Operating system images
- Deployment
- Chef – Configuration management
- Version control
- Workflow
- GMP - Integration of new tools
- Chef design @ SAP's clouds
- Conclusion
- Outlook

Motivation and goals

Motivation and goals

- SLES12 SP1 at the doorstep
 - all the changes that come with it ...
- historically grown deployment process
 - reinvent this completely
 - state of the art technology
- no real configuration management so far
- we wanted a fancy DevOps approach xD
- regaining a common base between several cloud landscapes

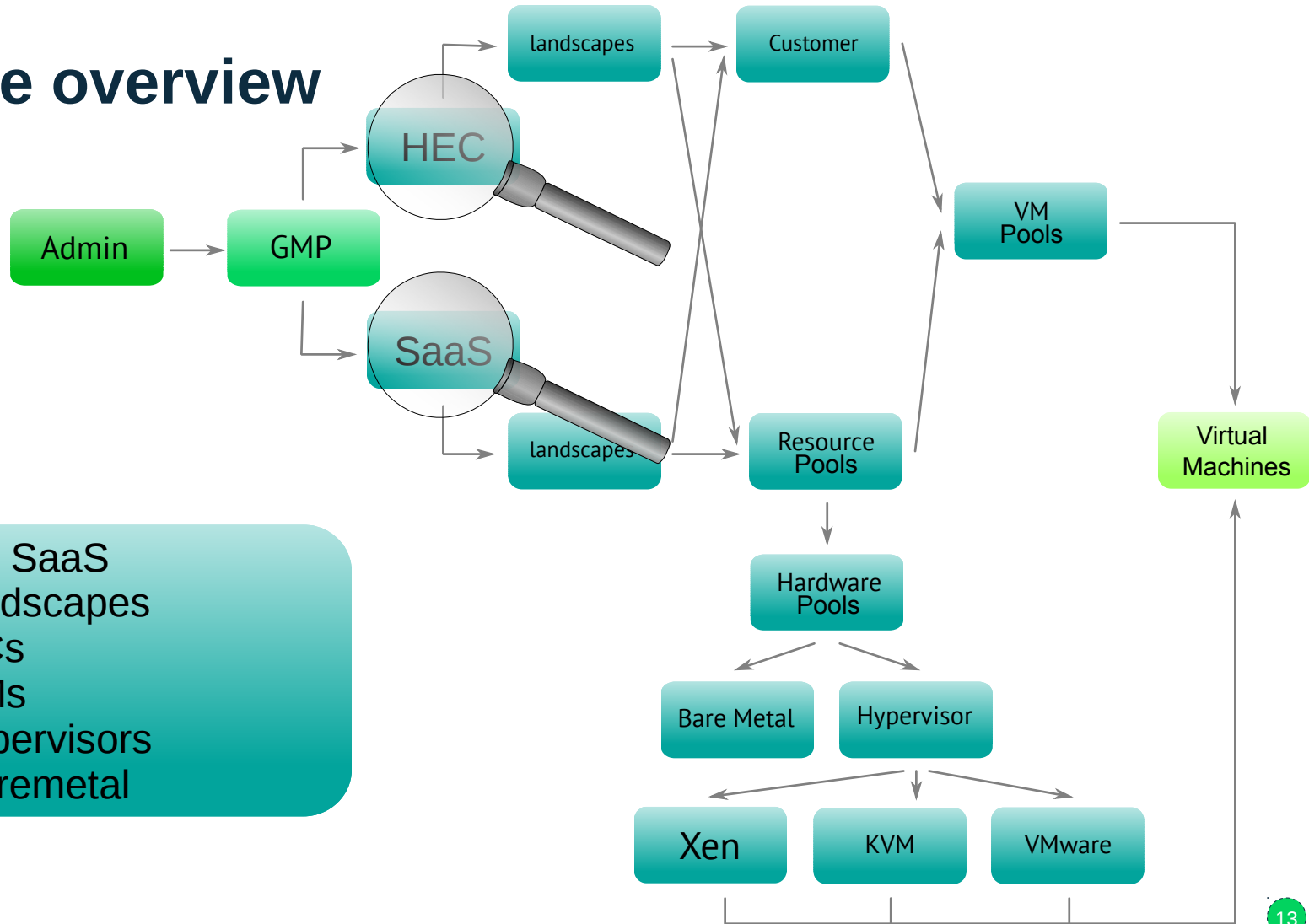
Software used

Software used

- SUSE Linux Enterprise Server 12
- Open Build Service
- kiwi(-ng)
- jenkins
- GitHub Enterprise
- chef
- chefdk
- Berkshelf
- test-kitchen
- docker

Landscape overview

Landscape overview



SaaS	
19	landscapes
8	DCs
32.000	VMs
3.700	hypervisors
1.100	Baremetal

GMP - Global Management Portal

Global Management Portal (GMP)

- SAP internal development
- orchestration platform for ...
 - network
 - network ranges
 - DHCP
 - DNS
 - hypervisor administration and deployment
 - virtual machine administration and deployment
 - operating system images
 - monitoring
 - LDAP administration
 - storage administration
 - remote execution tool
 - auditing
- customer frontend
- inventory database

Operating system images

OS images - ye olde way

- dump/restore a Goldmaster VM
 - update VM via “zypper up”
 - make changes directly in VM
 - different VMs for different image types
 - hypervisor
 - virtual machines

Pitfalls

- waste of resources
- dumping a running system is unclean
- no good version control/changelog
- no reproducible builds
- you do not really know what you are deploying

OS images - the fancy way

- build images with kiwi in OBS
 - define content
 - in descriptive language
 - in file form
 - kiwi files and xml in git
 - minimalistic image approach

Benefits

- integration in already existing OBS
- clean build
 - contents of the images are well-defined
 - reproducible builds
- release management
- ease of customization
- great changelog in git
- faster deployment
- up-to-date packages

Deployment

Deployment - ye olde way

- 1) (PXE boot)
- 2) Restore dumped image
- 3) (Re)boot
- 4) Fetch/execute firstboot script
 - a) perl scripts
 - b) config file templates
 - c) daemons to
enable/start/disable/stop
 - d) platform, DC specific parameters
- 5) Reboot
- 6) Machine is ready

Pitfalls

- data stored in files
- unmaintainable
- no “good” version control/changelog
- no reproducible builds

Deployment - the fancy way

- 1) (PXE boot)
- 2) Restore kiwi image
- 3) (Re)boot
- 4) cloud-init
 - a) network settings
 - b) chef-client settings
- 5) Execute chef-client
 - a) config file templates
 - b) daemons to enable/start/disable/stop
 - c) platform, DC specific parameters
- 6) Reboot
- 7) Machine is ready

Benefits

- clean deployment
- everything is kept in git
- great changelog in git
- way more maintainable

Chef - ConfigManagement

Chef design basics

- client/server architecture
- stored data
 - ***attributes*** defined in ***roles***
- execution of code
 - ***cookbooks/recipes***
- design of dependencies
 - ***roles*** for landscapes/DCs (***attributes***)
 - ***nested roles*** for pools/customers/applications
 - ***run_list*** defines all ***roles*** and ***recipes*** for a client group or a single client
- lifecycle and release management
 - ***environments*** define ***cookbook versions***

Version control

Version control - ye olde way

and what doesn't come with it

- local SVN repo for Perl scripts
 - only firstboot under control
 - no version control for external sources

Pitfalls

- no real AAA
- no QA workflow
- no approval workflow

Version control - the fancy way

and what comes with it

- git(hub) for almost everything
 - kiwi files
 - cookbooks
 - in their own separate repositories
 - chef environments

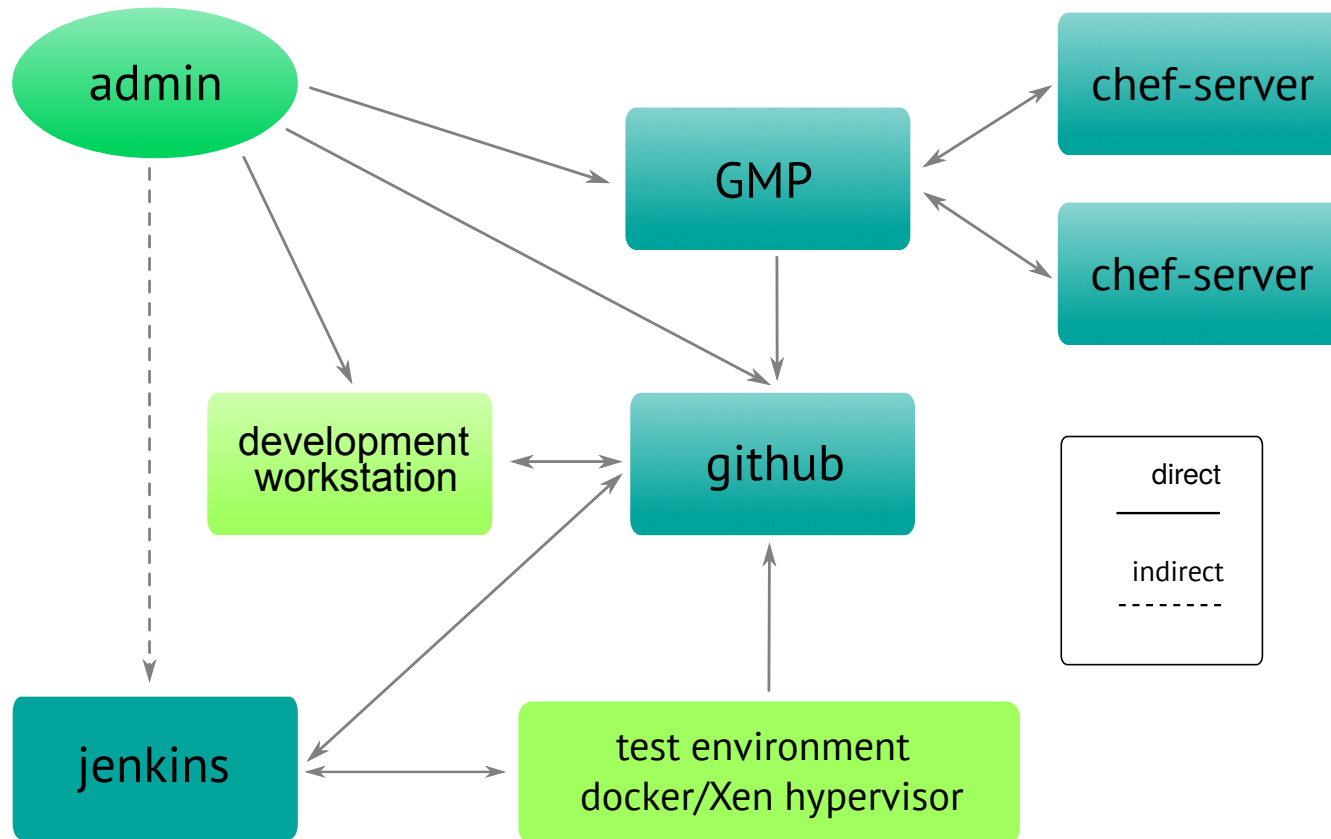
Benefits

- github is a well-known tool
- using SAP's internal github-enterprise
- real AAA
- Development /testing/ improvement/rollout workflows

Workflow

Workflow

dev/test/deploy



GMP (Global Management Portal) – Integration of new tools

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GMP integration

- automated chef-server install
- chef-server tasks
 - manipulating node objects
- configuration database and mapping of entities
 - images to pools
 - chef-servers to pools
 - attributes to landscapes/pools
 - run_list to pools/nodes
- automated sync: GMP → (git) → chef-server
 - landscape attributes (roles)
 - environments, cookbooks and roles

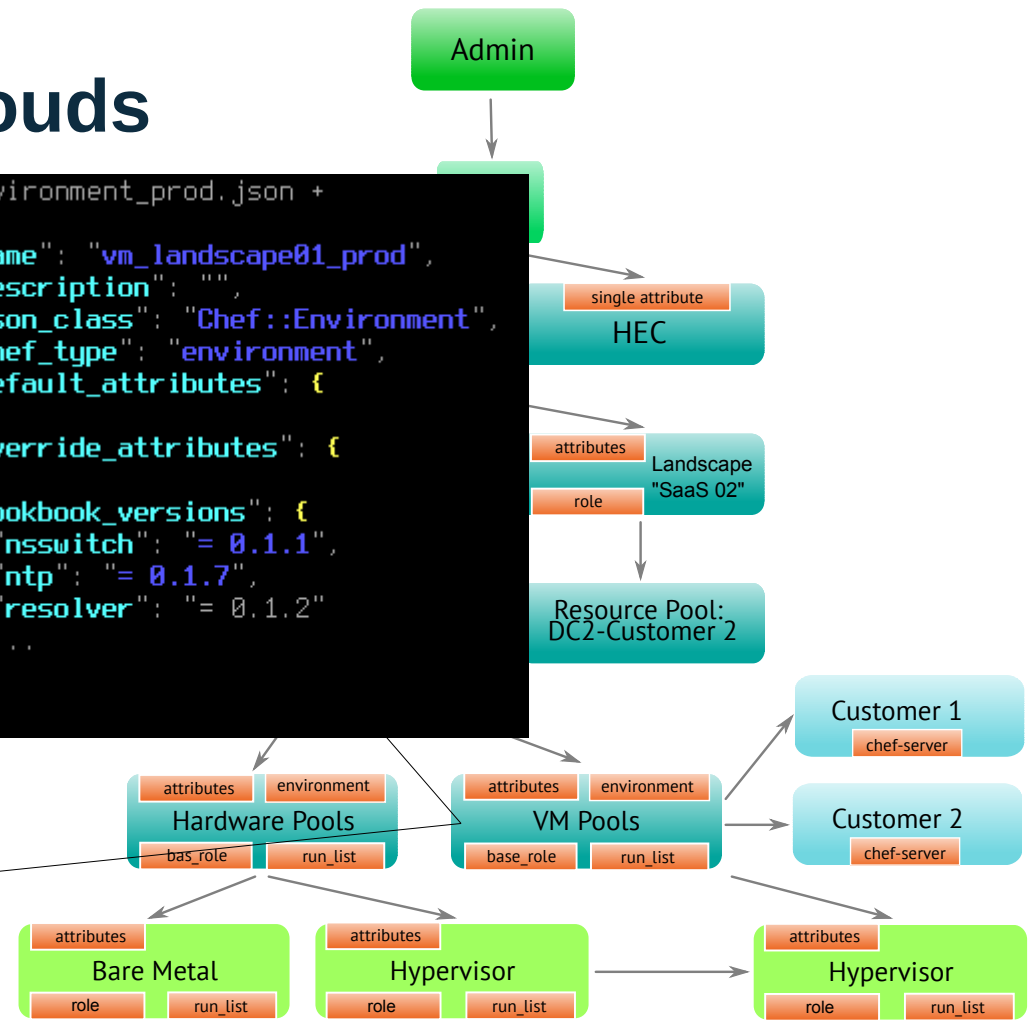
Chef design @ SAP's clouds

Chef design @ SAP's clouds

```
1 vm_base.json +
{
  "name": "vm_base",
  "chef_type": "role",
  "json_class": "Chef::Role",
  "description": "base role for VM deployment",
  "default_attributes": {
  },
  "override_attributes": {
    "auth": {
      "ldap_url": "ldap01.sap.com"
    }
  },
  "run_list": [
    "recipe[resolver]",
    "recipe[nsswitch]",
    "recipe[ntp]",
    ...
  ],
  "env_run_lists": {
  }
}
~
```

```
1 environment_prod.json +
{
  "name": "vm_landscape01_prod",
  "description": "",
  "json_class": "Chef::Environment",
  "chef_type": "environment",
  "default_attributes": {
  },
  "override_attributes": {
  },
  "cookbook_versions": {
    "nsswitch": "= 0.1.1",
    "ntp": "= 0.1.7",
    "resolver": "= 0.1.2"
  },
  ...
}
~
```

```
1 run_list.json +
{
  "run_list": [
    "role[landscape_saas_01]",
    "role[vm_base]",
    ...
  ]
}
~
```



Conclusion

Conclusion

- cleaned up deployment process
- working configuration management
- way better testing and integration workflow
 - implementing CI and CD
- identical infrastructure code in both SAP clouds
- future-proof
 - ready for new OS versions

Outlook

Outlook

- application deployment via Chef
- in-depth customization from customer side
 - cookbooks
 - coles
 - own chef servers (unmanaged)
- “backporting” deployment to SLES 11
- establishing configuration management for SLES11

Thank you

Thank you for making this possible!

- Tools team
 - Sebastian Koehn
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 - Florian Kellmer
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 - Christian Wolter
- MCD team
 - Tino Kaufmann
 - Alexander Lode
- SaaS Cloud team
 - Daniel Schier
 - Tobias Stolz
 - Ronny Tiebel
- ticketweb
 - Sebastian Krieger

Questions?

Related Talks ...

- SUSE Manager 3 & SaltStack at Tyson Foods
 - Friday, Nov 11, 10:15 AM - 11:15 AM

- The SUSE Manager Roadmap: A journey towards agile management of workloads in the enterprise
 - Friday, Nov 11, 9:00 AM - 10:00 AM

