**Pre-Checks and Preparations in GMP**

* GMP checks the necessary prerequisites, e.g. free IP addresses in the relevant access and storage networks.
* IP addresses and hostnames are being reserved by GMP

**Create VM**

* Generate\_vm\_object and lock it
* Reserving installation Resource:
  + CPU
  + memory
  + find suitable\_hypervisors: based on oasis connection status, available resources, hypervisor lock.
* Allocate\_vm\_resources:
  + determine DNS hosts
  + determine bridge name
  + determine NIC device name
  + generate IP MAC addresss and NIC
* Create and attach new VM-BlockDevices
* Restore image:
  + check if image can be retrieved
  + determine use which image
  + determine use which block device
  + get the image size
  + start download image
* Write VM config(/etc/xen/vm/vsa\*\*\*\*\*\*) and target prepare.
* Add security groups
* Customize\_vm:
  + (Special fullvirt VM setup)
  + kernel config: add modules: xen\_vnif, xen\_balloon, xen\_vbd
  + fstab: replace /dev/xvda and /dev/hda to /dev/hda1
  + mkinitrd
  + edit /etc/hosts: 10.68.37.169 vsa6560508.wdf.sap.corp vsa6560508
  + edit /etc/xen/xend-config.sxp
  + edit udev 70 rules
  + write routes to /mnt/tmp/vsa6654602/etc/sysconfig/network/routes
  + edit /etc/inittab
  + write vm ready script sayhello.pl
  + download firstboot and lastboot, and only enable firstboot.
* Mount vmspace under /tmp, deploy\_vm\_xen\_kernel(copy vmlinuz and initrd into vmspace), create\_kernel\_symlinks, then umount them.
* Power on VM:
  + power\_state\_check\_disable first and power\_state\_check\_enable
  + Write current HV to file in VMs vmspace
  + VMM check: check whether VM is reachable via Virtual Machine Manager
  + Waiting for VM start-up
* Update hypervisor's current free memory, cpu and disk values
* Unlock VM object
* Remove resource softlocks and set status to “Installed”
* Go on cloud-init…

## Cloud-init

**Cloud-init has 4 phases:**

* Local:
  + Mount -o ro,sync -t auto /dev/xvdx /run/cloud-init/tmp/tmp42sHxk
  + Get meta\_data.json, user\_data, network\_config
  + Umount it
* Init: migrator, bootcmd, write-files, growpart, resizefs, resolv\_conf, ca-certs, rsyslog, users-groups, ssh
* Config: mounts, set\_hostname, ssh-import-id, locale, set-passwords, package-update-upgrade-install, timezone, puppet, chef, salt-minion, mcollective, disable-ec2-metadata, runcmd, byobu
* Final: rightscale\_userdata, scripts-per-once, scripts-per-boot, scripts-per-instance, scripts-user, ssh-authkey-fingerprints, keys-to-console, phone-home, final-message, power-state-change

\*Bootcmd:

cat /dev/null > /etc/sysconfig/network/routes

echo -e 'default\t10.68.32.1\t-' >> /etc/sysconfig/network/routes

\*Runcmd:

service network stop

service network start

mkdir -p /opt/imal/log/ && echo -e "uuid:84D261807B9C11E9B8946986D8104351\n" > /opt/imal/log/gmp\_info

for i in `seq 1 7`; do err=0 && ping -c1 10.68.39.90 &>/dev/null && curl -s --fail --insecure --max-time 5 https://10.68.39.90:443 &>/dev/null && chef-client && break || echo $(date)Chefserver not reachable >> /var/log/messages && err=1 && sleep 1; done;

if [ $err = 1 ]; then

chef-client

fi

mv /root/sayhello.pl /opt/imal/log/

## Chef

**Chef server and chef environment: /etc/chef/client.rb**

**Chef base role and chef runlist: /etc/chef/firstboot.json**

* Chef provides the system with a baseline configuration profile
  + complete the network setup, e.g. populate /etc/resolv.conf with needed entries
  + setup basic services like sshd, LDAP, ntp, mail, etc.
  + install packages and start services for SAP/SaaS related services like joschyd
* Chef does not enforce correct configuration during the machines whole lifetime, as it is only run during installation
* Chef does only configure those files, services or packages that it has been told to configure

**Link:**

**Base role**

<https://github.wdf.sap.corp/CloudChef/chef/blob/master/roles/auto-generated/vmp_saas_development_byd-dev-rt.json>

**Environment**

<https://github.wdf.sap.corp/CloudChef/chef/blob/master/environments/_saas-vm-prod.json>

**Run list**

<https://github.wdf.sap.corp/CloudChef/chef/blob/master/roles/_saas-vm-init-prod.json>

## Reboot

* Reboot by cloud-init, see /etc/cloud/cloud.cfg:

*power\_state:*

*delay: "+1"*

*mode: reboot*

*message: "Rebooting after the installation has been finished"*

*timeout: 30*

* Set root password
* Set the final state of the VM to 'System available in Pool' in GMP (sayhello.pl)

UUID: 84D261807B9C11E9B8946986D8104351

## /etc/xen/vm/vsa\*\*\*\*\*\*

*<domain type="xen">*

*<name>vsa6462545</name>*

*<uuid>AF15CC3E-483E-11E9-86F5-BFAB1F420741</uuid>*

*<memory>16777216</memory>*

*<vcpu>8</vcpu>*

*<on\_poweroff>destroy</on\_poweroff>*

*<on\_reboot>restart</on\_reboot>*

*<on\_crash>destroy</on\_crash>*

*<os>*

*<type>hvm</type>*

*<loader>/usr/lib/xen/boot/hvmloader</loader>*

*<boot dev="hd" />*

*</os>*

*<features>*

*<apic />*

*<acpi />*

*<pae />*

*<hap />*

*</features>*

*<devices>*

*<emulator>/usr/lib/xen/bin/qemu-system-i386</emulator>*

*<interface type="bridge">*

*<source bridge="br251" />*

*<mac address="00:16:3e:87:b1:8b" />*

*<script path="vif-bridge" />*

*<target dev="v0-87b18b" />*

*<model type="netfront" />*

*</interface>*

*<interface type="bridge">*

*<source bridge="br302" />*

*<mac address="00:16:3e:87:b1:88" />*

*<script path="vif-bridge" />*

*<target dev="v1-87b188" />*

*<model type="netfront" />*

*</interface>*

*<disk type="file" device="disk">*

*<source file="/vdev/bd16824880-xvdc" />*

*<driver name="qemu" type="raw" />*

*<target dev="xvdc" />*

*</disk>*

*<disk type="file" device="disk">*

*<source file="/vdev/bd16824881-xvdb" />*

*<driver name="qemu" type="raw" />*

*<target dev="xvdb" />*

*</disk>*

*<disk type="file" device="disk">*

*<source file="/vdev/bd16824882-xvdd" />*

*<driver name="qemu" type="raw" />*

*<target dev="xvdd" />*

*</disk>*

*<disk type="file" device="disk">*

*<source file="/vdev/bd16824883-xvda" />*

*<driver name="qemu" type="raw" />*

*<target dev="xvda" />*

*</disk>*

*<disk type="file" device="disk">*

*<source file="/vdev/bd16824884-xvdz" />*

*<driver name="qemu" type="raw" />*

*<target dev="xvdz" />*

*</disk>*

*<console tty="/dev/pts/1" />*

*<graphics type="vnc" port="-1" autoport="yes" keymap="en-us" />*

*</devices>*

*</domain>*

## All full virtualized adoptions

*### special fullvirt VM setup ###*

*default 0*

*timeout 1*

*title HVM boot*

*root (hd0,0)*

*kernel /boot/vmlinuz root=/dev/hda1*

*initrd /boot/initrd*

## ./openstack/content/network\_config

*auto eth0*

*iface eth0 inet static*

*gateway 10.68.32.1*

*address 10.68.36.224*

*netmask 255.255.224.0*

*broadcast 10.68.63.255*

*auto eth1*

*iface eth1 inet static*

*address 10.70.103.247*

*netmask 255.255.224.0*

*broadcast 10.70.127.255*

## ./openstack/latest/meta\_data.json

*{"network\_config":{"content\_path":"/content/network\_config"},"launch\_index":1,"hostname":"vsa6656996","uuid":"84D261807B9C11E9B8946986D8104351","meta":{"dsmode":"local"}}*

## ./openstack/latest/user\_data

*#cloud-config*

*---*

*bootcmd:*

*- cloud-init-per once my\_cmd1 sh -xc "cat /dev/null > /etc/sysconfig/network/routes"*

*- cloud-init-per once my\_cmd2 sh -xc "echo -e 'default\t10.68.32.1\t-' >> /etc/sysconfig/network/routes"*

*chef:*

*environment: \_saas-vm-prod*

*force\_install: false*

*initial\_attributes: {}*

*install\_type: packages*

*node\_name: vsa6656996*

*run\_list:*

*- 'role[vmp\_saas\_development\_byd-dev-rt]'*

*- 'role[\_saas-vm-init-prod]'*

*server\_url: https://10.68.39.90:443/organizations/saas*

*validation\_cert: |-*

*-----BEGIN RSA PRIVATE KEY-----*

*MIIEpQIBAAKCAQEAxEpkOjwMHhsl6zPBSBO6WQK3lZveskvcLDOCm4MQytW/H9VQ*

*g0PdHDl2EEsVcrWyMTmEvywuw09mjD/wI2Apk7Q5mXahJNYTniewAwWXUe81+tLX*

*XJ0luavLy2LH9lOe0oWnm9AsKLWrywvhyG0JL3hI5N2Xkobz2qUJ2BMXYhbtIG4g*

*WyK7fXCKOKSjptlQEjHM8lxgNrebzM7NA6zC23flO6YzOZ7/XHM5VmcbsIEV9wKc*

*6hCJwxsMSUOzokndyN9uiyfeRx76jO5vKmJpElHDgOR/fSaVk9AjSUgGeo2uk+Xk*

*H8u9WasGl91V7vfwUpMQc9M8FiJwLNtzQqJ6OwIDAQABAoIBAQDCBTI6qZ3kqDr7*

*2EVlRDK+xsPF+rLOE9PGUQf5RTz08QAgrA4QIaVNv7JmeoDxyI0gwNTozfhPD42y*

*dYScwvF10P/aI/s2WPA9NMdyxTUEROlbSsqa/a4Lb7daCwLSBWeIeZnploP/nUr4*

*wX7kSHp61G9g4XNv3zrsVJN9Y6mKRpjSPUcyiQFEJRRTsj6b5d3iRDLMRQR1G3DH*

*2zAPlPoewjUGHjxzwgQhe2dV3R3JCZLaLrs+xzR32EVTYQMzxXijY2t2aLcGbVTY*

*phP+XDG+3TFS22qjfYrnUvjqN4MO1s6v/Xcg8G4HRyhh4YKk79fsTRDKbGZTh0KV*

*ixwI4QUxAoGBAPBkajx75PaCQFKqaJkcOv7rPFMbg+0VJiNyw8yVxJcoFgIIQhcO*

*aFawyRuUaP+mp8gJSTeA6gDQqhRsy/xijizE7A54kV29a5jtSHWrY4S/Oi1eWFAU*

*sL3Imp7RdE312Q8D52VMOY6F20119PkYOZAbq4e6oyihtIm47iUNgW9jAoGBANEI*

*9VBVJjmOwj3iK6vUaQvY44m7X2Vx+VWX9yPHq5DJkCY3OzSklxr6LL0yMG0toL7K*

*tUTHJQc+3DPJA9sQ3GpfMiHLmmuw6frMnQNatWboK3nCl7P4i7ockjtjik4m0yZN*

*oRmIpA20J+5OGieMt/57xCwQtK3Q8+ibfp1QDp1JAoGBALiK7b9nATt4fHa5mTjJ*

*IkUmQxYtzlZH4RJffQ5mfxfnTxXaTxoyFklOx+RjR0PTJYR8FHgGgB2GErtBVkt3*

*QVv/BJSLXFURIDOzHOgwXWLABqJjhfpcF95pzMFVXCqpLCvJvG7YWGsgOV26ywga*

*373QcBrvXWfI07bSgAdz2cSvAoGBAKtc6q5mf6Wj0L0mkqKUyWD69t3Mi5IAc2Sl*

*5eahI5bYhqGtmY24eF+XQ+H+KRD33NVMHHo7v7FG6QJTAiQumGNjkxd9cCRkrgv6*

*faVoUVoBbtKsoezaDsIN9htVqOYUkfjOnwjtqX/Kdwm3YV2W0KeBEvsE3vm3WJ0S*

*DCQuoyxxAoGAdwp3ge2E4zzRN83xO857n71kBMsZHIsS2siFlkyxg67WBOQxbN2N*

*iO1tKUZ/jrPvfd7/BRTsdXOJwFhCF24dGV+CAOuKNPO2ocgIKJTIOIDChUPdrvbJ*

*Jk8mwjSau6uTyxwMDEOLD9Z+leUG+sqVuOM3m2KKzl0h9qPElFY4RAw=*

*-----END RSA PRIVATE KEY-----*

*validation\_name: saas-validator*

*hostname: vsa6656996*

*runcmd:*

*- service network stop*

*- service network start*

*- mkdir -p /opt/imal/log/ && echo -e "uuid:84D261807B9C11E9B8946986D8104351\n" > /opt/imal/log/gmp\_info*

*- 'for i in `seq 1 7`; do err=0 && ping -c1 10.68.39.90 &>/dev/null && curl -s --fail --insecure --max-time 5 https://10.68.39.90:443 &>/dev/null && chef-client && break || echo $(date) - Chefserver not reachable >> /var/log/messages && err=1 && sleep 1; done;'*

*- |-*

*if [ $err = 1 ]; then*

*chef-client*

*fi*

*- mv /root/sayhello.pl /opt/imal/log/*

*set\_hostname: vsa6656996*

*write\_files:*

*- content: "dm1wb29sID0gQllELURFVi1SVApsYW5kc2NhcGUgPSBEZXZlbG9wbWVudA==\n"*

*encoding: base64*

*path: /opt/imal/etc/gmp\_info*

*- content: |*

*IyEvdXNyL2Jpbi9wZXJsCiMjIFNBWSBIRUxMTyBTQ1JJUFQgLS0gdGVsbCB0aGUgR01QIG9yIEdN*

*VCB0aGF0IHRoZSBWTSBpcyBhdmFpbGFibGUgaW4gcG9vbCBub3cKdXNlIHN0cmljdDsKdXNlIGxp*

*YiAnL29wdC9pbWFsL2xpYic7CnVzZSBPU0w7Cm15ICRjb25maWcgPSB7CiAgICdMb2cnID0+IHsK*

*ICAgJ29ial9pdGVtX2lkJyA9PiAnNjEwNTQ5NjMnLAogICB9LAogICAnT0FTSVNDb21tJyA9PiB7*

*CiAgICAgICdyb3V0ZScgICA9PiAnMTAuNjguNjMuMjQyfGdtcCcsCiAgICAgICdzZXJ2aWNlJyA9*

*PiAnTGVpdHN0YW5kJywKICAgfSwKfTsKCm15ICRtZXNzYWdlICAgPSBzaGlmdCBAQVJHVjsKbXkg*

*JE9TTCAgICAgICA9IE9TTC0+bmV3KCRjb25maWcpOwpteSAkbWF4X3JldHJ5ID0gMTA7Cgpmb3Ig*

*KG15ICRyZXRyeV9jb3VudGVyID0gMDsgJHJldHJ5X2NvdW50ZXIgPD0gJG1heF9yZXRyeTsgJHJl*

*dHJ5X2NvdW50ZXIrKykgewogICBldmFsIHsKICAgICAgJE9TTC0+T0FTSVNDb21tLT5kaXNjb25u*

*ZWN0KCk7CiAgICAgICRPU0wtPk9BU0lTQ29tbS0+Y29ubmVjdCgpOwogICAgICAkT1NMLT5PQVNJ*

*U0NvbW0tPnN0YXR1cygkbWVzc2FnZSk7CiAgIH07CiAgIGlmIChub3QgJEApIHsKICAgICAgbGFz*

*dDsKICAgfSBlbHNlIHsKICAgICAgaWYgKCRyZXRyeV9jb3VudGVyID09ICRtYXhfcmV0cnkpIHsK*

*ICAgICAgICAgZGllKCRAKQogICAgICB9CiAgIH0KICAgc2xlZXAoMzApOwp9*

*encoding: base64*

*path: /root/sayhello.pl*

*permissions: 0755*

## /etc/cloud/cloud.cfg

*disable\_root: false*

*ssh\_pwauth: true*

*preserve\_hostname: false*

*syslog\_fix\_perms: root:root*

*mount\_default\_fields: [~, ~, 'auto', 'defaults', '0', '2']*

*power\_state:*

*delay: "+1"*

*mode: reboot*

*message: "Rebooting after the installation has been finished"*

*timeout: 30*

*cloud\_init\_modules:*

*- migrator*

*- bootcmd*

*- write-files*

*- growpart*

*- resizefs*

*- resolv\_conf*

*- ca-certs*

*- rsyslog*

*- users-groups*

*- ssh*

*cloud\_config\_modules:*

*- mounts*

*- set\_hostname*

*- ssh-import-id*

*- locale*

*- set-passwords*

*- package-update-upgrade-install*

*- timezone*

*- puppet*

*- chef*

*- salt-minion*

*- mcollective*

*- disable-ec2-metadata*

*- runcmd*

*- byobu*

*cloud\_final\_modules:*

*- rightscale\_userdata*

*- scripts-per-once*

*- scripts-per-boot*

*- scripts-per-instance*

*- scripts-user*

*- ssh-authkey-fingerprints*

*- keys-to-console*

*- phone-home*

*- final-message*

*- power-state-change*

*system\_info:*

*distro: sles*

*paths:*

*cloud\_dir: /var/lib/cloud/*

*templates\_dir: /etc/cloud/templates/*

*ssh\_svcname: sshd*

*datasource\_list: [ ConfigDrive, OpenStack, Ec2 ]*

*datasource:*

*OpenStack:*

*metadata\_urls: [ 'http://169.254.169.254:80' ]*

*dsmode: net*