OpenStack at large retail enterprise - Boon or bane?

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About
About me

Thomas Lunkwitz (0x29 y)
- Product Owner for „Compute Cloud“ at METRONOM
  - Working at METRONOM and its precursor for 16 years
  - Career started as network specialist for WAN and LAN
  - Started with OpenStack as project in 2014
  - Product owner for OpenStack since 2017

- Volunteer at German Federal Agency of Technical Relief (THW)

“I am a METRONOMIAN”
About METRONOM

We set the pace in food and technology.

- METRONOM is the tech unit of METRO, a leading international wholesale and food specialist company
- Around 2,000 people working for METRONOM mainly in Berlin, Duesseldorf, Hannover, Brasov and Bucharest
- Our Vision:

  *Our culture, services and digital solutions are unmatched in the global wholesale business. We revolutionize the entire industry – working with us is a privilege!*
Boon and Bane – But why?
“Bane” because ...

- Previous structure of METRO IT was totally vendor driven
  - Open source was used only for niche products
- We were not contributing to or working in communities
- We had a lot of very good teams in different departments
  - These departments were more like Silos
- We were not really acting as one big team
- The world and especially the IT is changing very fast
- IT is becoming consumable like electricity

- We are changing our culture and mindset
“Boon” because ...

- Cloud is becoming more and more important in the IT market
- In future we will see many more features and software which are only available in the cloud
- Hybrid cloud approach will be the future
  - Using a public cloud environment brings flexibility and additional features
  - Not all data can or should be stored in the public cloud
  - Using an internal cloud based IaaS provides:
    - Safety
    - Alternative to public cloud providers
- OpenStack and cloud forces and supports us to change our culture and mindset

- OpenStack is open and provides the open infrastructure we need
Advantages of private cloud

- Everything is consumable as self-service – easy to start
- Fully integrated into corporate network
- Data protection and data privacy are guaranteed (on-premise)
- Cost effective (non-profit cost level) – pay-per-use
Consume infrastructure

- Everything is consumable as self-service – easy to start
  - As of today a tenant has to be requested by a webform
  - We will create the project and the users in OpenStack
  - Once the project and users are created, everything else is consumable as self-service

- We will work on a shop system, so that even a project can be created automatically
  - Idea is to implement a kind of web shop for infrastructure products
  - The shop system will be based on open source software
  - PoC is not started yet

- From an idea to start in less then five minutes
Fully integrated

- Fully redundant and highly scalable infrastructure

n x 10 Gbps WAN

Classification level: public
Data protection and privacy

- Private cloud for METRO only
- All hardware is located in METRONOM or METRONOM managed data centres
  - Full physical access control by METRONOM
  - No issues in terms of GDPR and external service providers
- Data encryption is strongly recommended to our customers
- We provide block and object storage
  - Everything is provided in the context of the project
  - We do not provide any kind of shared storage
  - Local storage volumes will be overwritten when deleted

- In future we will encrypt all data by default on hardware level
Cost effectiveness

- METRONOM is a non-profit Tech of METRO
  - We charge only for our costs
- We reduce hardware costs by standardising our server flavours
- We charge on a pay-per-use model
  - Smallest unit is one hour
- We charge for
  - Instances
  - Storage
  - Public floating IPs

- Full cost transparency for our customers by monthly reports
Our OpenStack Deployments

Three data centres in Germany and China

Frankfurt  
Duesseldorf  
Shanghai
Our deployments

- We built 6 OpenStack fully independent environments
  - 2 based on Suse OpenStack Cloud 5 (Juno)
    - Those were the first productive environments from 2015
    - The will be decommissioned by the end of 2018
  - 4 based on OpenStack Ansible (Newton)
    - 2 in Duesseldorf
    - 1 in Frankfurt
    - 1 in Shanghai
  - Options for two more
    - 1 in Moscow
    - 1 in Frankfurt
Design your application landscape

Load balancer or DNS Load balancing

Environment 1

Environment 2

Environment 3
Design your application landscape

- Prerequisites for our customers:
  - Be prepared for any kind of failure
  - A VM could fail and even be lost at any time
  - Even a compute host could fail and we probably will not repair it
  - It is strongly recommended to spread the application across multiple environments if it is needed in HA mode

- We “educate” our colleagues and customers to handle failures in the infrastructure more efficiently

- We offer support and consultancy but we do not implement anything for them
Software we use

- Ubuntu Server 16.04 LTS
- OpenStack Ansible (Newton)
- CEPH-Ansible (Jewel)

- OpenStack modules
  - Keystone
  - Nova
  - Neutron
  - Horizon
  - Cinder
  - Swift
  - Ceilometer (will be replaced)
  - Glance
  - Heat
Our architecture

- Everything is distributed over three racks
  - Per Rack
    - One controller
    - 1 to n compute hosts
    - One monitor node (Rados GW)
    - 1 to n storage hosts
    - Max. 32 nodes in total
    - Free spare RU for TOR Switches

- Actual end-of-the-row switch concept
  - Might change to TOR with Spine-Leaf architecture
Our network design

- Per controller / monitor / compute host
  - 1 x 1 Gbps Ethernet copper - Hardware management (iLo, CIMC, iBMC)
  - 2 x 1 Gbps Ethernet copper - OpenStack management (active/backup failover mode)
  - 2 x 10 Gbps Ethernet fibre - user traffic (active/active bond)
  - VxLAN with DVR

- Per storage host
  - 1 x 1 Gbps Ethernet copper - Hardware management (iLo, CIMC, iBMC)
  - 2 x 1 Gbps Ethernet copper - OpenStack management (active/backup failover mode)
  - 2 x 10 Gbps Ethernet fibre - storage traffic (active/active bond)
  - 2 x 10 Gbps Ethernet fibre - replication traffic (active/active bond)
# Available resources and running VMs

<table>
<thead>
<tr>
<th>Env.</th>
<th>Comp. Hosts</th>
<th>CPU (1:4)*</th>
<th>RAM (1:1)*</th>
<th>Storage (1:1)*</th>
<th>VMs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Physical</td>
<td>Hyperthr.</td>
<td>vCPU</td>
<td></td>
</tr>
<tr>
<td>DUS10**</td>
<td>29</td>
<td>550</td>
<td>1.100</td>
<td>4.400</td>
<td>~ 14 TB</td>
</tr>
<tr>
<td>DUS11</td>
<td>18</td>
<td>360</td>
<td>720</td>
<td>2.880</td>
<td>~ 9 TB</td>
</tr>
<tr>
<td>DUS21</td>
<td>60</td>
<td>2.220</td>
<td>4.440</td>
<td>17.760</td>
<td>~ 30 TB</td>
</tr>
<tr>
<td>FFM10**</td>
<td>14</td>
<td>280</td>
<td>560</td>
<td>2.240</td>
<td>~ 6 TB</td>
</tr>
<tr>
<td>FRA11</td>
<td>33</td>
<td>660</td>
<td>1.320</td>
<td>5.280</td>
<td>~ 17 TB</td>
</tr>
<tr>
<td>SHA11</td>
<td>39</td>
<td>1.320</td>
<td>2.640</td>
<td>10.560</td>
<td>~ 20 TB</td>
</tr>
<tr>
<td>Total</td>
<td>193</td>
<td>5,390</td>
<td>10,780</td>
<td>43,210</td>
<td>~ 96 TB</td>
</tr>
</tbody>
</table>

* ): Over commitment physical:virtual

** ): Discontinued by end of 2018
Challenges

- Assure installation of an environment
  - Mirror all resources needed for an installation
  - Being able to install even without Internet

- Building a CI/CD pipeline
  - Assure that all environments are on the same version with same settings
  - Optimize monitoring and support process

- Major upgrade to Rocky or newer
It’s all about people!
“People don’t buy what you do, they buy why you do it.” Simon Sinek

- Success is not only a question of technology, it is rather a question of passion and people
- We are hiring for potential and personality
- We work in self-organized teams

We drive innovation, not just follow!
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# Join the team
# METRONOM GmbH

- hosts: you
  pre_tasks:
  - name: Check Prerequisites
    assert:
      that:
      - NEW_JOB_WANTED == "True"

- name: Set facts
  set_fact:
    - flexible_working_hours: "True"
    - employee_benefits: "True"
    - teamwork: "True"

tasks:
- name: Check applicant soft skills
  soft_skills:
    skill: "{{ item }}"
    state: present
  with_items:
  - Teamplayer
  - Flexibility
  - Humor
  register: soft_skills_match

- name: Check applicant Tech skills
  technical_skills:
    skill: "{{ item }}"
    match_type: regex
    state: present
  with_items:
  - Linux
  - Ansible|Puppet|Chef
  - Python|GO
  - Network|Docker|Kubernetes
  register: technical_skills_match

- name: Prepare and send job application
  uri:
    target: "{{ WWW.METRONOM.COM/APPLY }}"
  when: soft_skills_match == True and technical_skills_match == True
Contact

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Drop me a line!
I will respond within 48 hours.
Thank you for your attention!

Thomas Lunkwitz