Go Big or Go Home
SAP’s Journey to Offering a Public PaaS built with Cloud Foundry

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June 2017
About me

Bernd Krannich

Technical Lead for Cloud Foundry Core in SAP Cloud Platform (SAP’s Platform as a Service)

19 years with SAP

- SAP Business Information Warehouse/Business Explorer
- SAP Business Objects
- SAP NetWeaver Application Server ABAP
- Today: SAP Cloud Platform
Agenda

SAP and SAP Cloud Platform

What We Learned
  • Knowledge
  • Open Source
  • Operations
  • Security
  • Certifications

What’s Next for SAP Cloud Platform and Cloud Foundry
SAP Facts and Figures

76% of the world’s transaction revenue touches an SAP system.

SAP customers represent 87% of Forbes Global 2000 companies.

Cloud solutions from SAP provide the freedom for 130 million people to work from anywhere.

Our customers produce more than 79% of the world’s chocolate.

350,000+ customers in 180+ countries

85,200+ employees in 130+ countries

23,300+ employees in R & D

15,000+ SAP partner companies globally

125 mil. subscribes in our cloud user base

Source: SAP Fast Facts Central, SAP Company Information
The Making of SAP Cloud Platform
Understanding the Past and Present of SAP Solutions and Technology
SAP Cloud Platform
The Platform-as-a-Service powering enterprise business

7100+
SAP Cloud Platform Customers

600+
Partners Building Apps on SAP Cloud Platform

40+
SAP Enterprise Apps Delivered on SAP Cloud Platform

1,000+
Apps Available on the SAP App Center
SAP Cloud Platform Cloud Foundry Adoption Timeline

2011
- Apr: CF Announcement by VMWare
- Jul: IBM and Cloud Foundry team up
- Q2/Q3: CF evaluation at SAP
- Sep: SAP/VMWare 1st business conversations
- Oct: NoGo decision for CF inside SAP

2013
- Feb: SAP joins CF Foundation
- Jun: SAP keynote at CF Summit
- Q1: SAP Cloud Platform CF Certified Platform for 2013
- Q3: First SAP employees join CF Dojo

2014
- Feb: SAP joins CF Foundation
- Jun: SAP keynote at CF Summit
- Q3: First SAP employees join CF Dojo
- Q4: Start of collaboration with Siemens on Mindsphere
- Dec: SAP Cloud Platform CF Certified Platform for 2016

2015
- Q1: SAP Leonardo based on SAP Cloud Platform CF
- May: SAP Cloud Platform Cloud Foundry Beta
- May: SAP Cloud Platform Cloud Foundry GA

2016
- Mar: Siemens Mindsphere powered by SAP CP CF Live
- Sep: SAP opens BOSH OpenStack CPI Dojo in Walldorf
- Q4: Cooperation with MS Azure and Google Cloud

2017
- Q1: SAP Cloud Platform CF Certified Platform for 2017
- Q1: SAP Leonardo based on SAP Cloud Platform CF
- May: SAP Cloud Platform Cloud Foundry Beta
Data centers build-out plan (2017)

<table>
<thead>
<tr>
<th>Region/Location</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashburn, NA</td>
<td>operational</td>
</tr>
<tr>
<td>Phoenix, NA</td>
<td>operational</td>
</tr>
<tr>
<td>Amsterdam, EU</td>
<td>operational</td>
</tr>
<tr>
<td>Rot, EU</td>
<td>operational</td>
</tr>
<tr>
<td>Sydney, ANZ</td>
<td>operational</td>
</tr>
<tr>
<td>Tokyo, APJ</td>
<td>operational</td>
</tr>
<tr>
<td>Shanghai, APJ</td>
<td>operational</td>
</tr>
<tr>
<td>Moscow, Asia</td>
<td>Q3/2017</td>
</tr>
<tr>
<td>Toronto, NA</td>
<td>Q3/2017</td>
</tr>
<tr>
<td>Sao Paulo, LATAM</td>
<td>Q4/2017</td>
</tr>
<tr>
<td>Dubai, EMEA</td>
<td>Q1/2018</td>
</tr>
<tr>
<td>AWS, EU</td>
<td>operational</td>
</tr>
<tr>
<td>AWS, NA (beta)</td>
<td>operational</td>
</tr>
</tbody>
</table>

Disclaimer: Dates are subject to change and considerable delays may be introduced due to unforeseen circumstances.

1) BETA, 2) planned innovations / future direction
# SAP Cloud Platform Cockpit Impressions

## Cloud Foundry
- **Europo (Frankfurt)**
  - Infrastructure: AWS
- **US East (VA)**
  - Infrastructure: AWS
- **US West (CA) Beta**
  - Infrastructure: Azure

## Neo
- **Australia (Sydney)**
  - Infrastructure: SAP
- **China (Shanghai)**
  - Infrastructure: SAP
- **Europe (Rot)**
  - Infrastructure: SAP
- **Europe (Rot) - Trial**
  - Infrastructure: SAP
- **US East (Ashburn)**
  - Infrastructure: SAP
- **US East (Sterling)**
  - Infrastructure: SAP
- **US West (Chandler)**
  - Infrastructure: SAP

Learn more about regions and the different infrastructures.
# SAP Cloud Platform Cockpit Impressions

## Data & Storage

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Data Services</td>
<td>Complete Big Data as a Service offering: Hadoop, Spark, and other data science tools.</td>
</tr>
<tr>
<td>Document Service</td>
<td>Store and manage all your documents.</td>
</tr>
<tr>
<td>Object Store</td>
<td>Highly-available and distributed object store.</td>
</tr>
<tr>
<td>PostgreSQL</td>
<td>Relational database with an object-oriented model.</td>
</tr>
<tr>
<td>Redis</td>
<td>Use Redis to store data structures, in-memory.</td>
</tr>
<tr>
<td>SAP ASE</td>
<td>Set up and manage SAP Adaptive Server Enterprise (ASE) databases and bind them to cloud applications.</td>
</tr>
<tr>
<td>SAP HANA</td>
<td>Set up and manage SAP HANA databases and bind them to cloud applications.</td>
</tr>
</tbody>
</table>

## DevOps

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Logs</td>
<td>Stream logs of bound applications to central application logging stack.</td>
</tr>
<tr>
<td>Corp. Git Link for SAP Web IDE</td>
<td>Enables you to subscribe to Orion and manage connectivity to your Git repository.</td>
</tr>
<tr>
<td>Debugging Service</td>
<td>Debug your Java application even through networks with high latency.</td>
</tr>
<tr>
<td>Git Service</td>
<td>Allows to store and version source code in Git repositories.</td>
</tr>
<tr>
<td>Lifecycle Management</td>
<td>Manages the lifecycle of Java applications using the service REST API.</td>
</tr>
</tbody>
</table>
SAP Cloud Platform Cockpit Impressions
High-level overview

Development

SAP Cloud Platform

Operations

SAP Web IDE / SAP API Business Hub

Cockpit

Marketplace

Business Services

- Commerce
- Localization/Tax
- Data Quality
- ...

Platform Services

- Integration
- Analytics
- Mobile
- IoT
- Development
- Lifecycle Management
- Profiling
- Monitoring
- Debugging
- Performance statistics

Data & Storage Services

- SAP ASE
- Redis
- (Big) Data Services:
  - SAP HANA
  - Hadoop
  - SAP Yona²
- Virtual Machines

Programming models

- HTML5
- XSJS/XSA
- Java
- Node.js
- Python
- Community buildpacks

SaaS

- SAP S/4HANA
- SAP SuccessFactors
- SAP Cloud for Customer
- SAP Ariba
- Concur
- SAP Fieldglass
- SAP Business ByDesign

On-Premise / Managed Cloud

- SAP S/4HANA
- SAP Business Suite
- SAP Business Warehouse

Virtual Machines

1) BETA
2) planned innovations / future direction

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What we Learned

Knowledge  Open Source  Operations  Security  Certifications
What we learned: Knowledge

Training people building Cloud Foundry is important

- Starts with hiring: “SAP does the cool stuff!?!?”
- Cloud Foundry Dojo and pair programming work
- From single language to polyglot development
- Multi-cloud: Infrastructures are similar, yet different
- “Good old basics”: Distributed systems, networking, Linux, ...
- Requires Cloud development environment: No corporate proxies/open network, Linux/Mac, ...
What we learned: Knowledge

Training people *using* Cloud Foundry is important

Moving people from on premise to cloud mindset takes time and effort

- **3.000** attendees for Cloud Basics training
- **700** attendees Microservice development training
- **500** attendees Continuous Delivery training

Trainings provide nice stress tests you can learn from

Internal Cloud Foundry Canary deployment widely used:

Close to **4.000** active developers in peak time
What we learned: Open Source

Open Source has won in the Enterprise

- Unless you are the early champion, there’s no other chance to keep the pace
- Openness/Open Source as important selling aspect

Open Source Consumption

- …is not enough: Consume, contribute, influence
- …saves time in the early adoption stages – knowledge build-up is still required
- Use it, as it was intended to be used
- Forking means death

Processes: Make sure internal processes are set up to match agility

SAP Cloud Platform Cloud Foundry meanwhile represents biggest Open Source usage at SAP
Credo

In contrast to other vendors, it is SAP’s goal to commoditize the PaaS layer. In order to do so it is necessary to provide competitive offerings like Core Infrastructure, Services, etc. with the lowest possible effort.

This is done by using as much Open Source as possible. For PaaS components that are not yet part of the Cloud Foundry Open Source SAP does actively drive the creation of such components jointly with the community. In this sense, SAP is more of a distributor/systems integrator in the PaaS space.

Moreover, with Cloud Foundry being a technology SAP is building it’s Cloud Strategy on, SAP continues to actively influence the community to move in the direction SAP requires to develop and deliver it’s business services and applications: Responding to containerization, setting standards for security and compliance, amongst others are key to making sure the Cloud Foundry ecosystem continues to be the primary choice for vendors for the years to come.
Our commitment/Contributions to Cloud Foundry

Instantiated/managed:
- BOSH OpenStack CPI
- CF OpenStack Validator
- Service Fabrik
- IPSec BOSH Release
- Abacus Plugins (incubating)
- Kubernetes CPI
- Java Memory Assistant

Major contributions:
- BOSH Core (OpenStack CPI, …)
- Garden
- Cloud Controller (upcoming)
- App Autoscaler (with IBM)
- App Autosleep (with Orange)
- Abacus
- CF Admin UI
- Open Service Broker API spec

Committees:
- UAA
- Java buildpack
Overall SAP CF Contribution Statistics 2014 – May 2017
What we learned: Operations

**BOSH is a great tool** powering our CF landscapes
- The de-facto standard to run CF and related deployments, we love it
- Manage deployments on different IaaSes/DCs with reasonable operational effort

**Observe** (in production), **learn, adapt** is better than solving theoretical problems

Deployments will **grow huge** if truely used
- Multi-account/tenant/...
- Few thousands of virtual machines

You hit **bottlenecks and issues** others didn’t hit
- Issues with early gorouter scaling
- Memory calculation logic in Java buildpack
- Metrics emitted grow as traffic grows
Sample Concourse Pipeline Impression
System Landscape Layout of Multi-Cloud

- AWS Dev Systems
- OpenStack Dev Systems
- Azure Dev Systems
- GCP Dev Systems

Staging Systems:
- AWS
- OpenStack
- Azure
- GCP

Internal Canary System
- Canary

Hotfix Systems:
- AWS
- OpenStack
- Azure
- GCP

Live Systems:
- AWS
- OpenStack
- Azure
- GCP
What we learned: Security

Open Source and Security
- Using Open Source, you don't sleep as well anymore
- Know your dependencies
- Agile security response process is important
- Fall forward often the best strategy

Cloud security is different from on premise security
- Perimeter security is dead, it's been replaced by security in depth
- Authentication, authorization and encryption
- Penetration testing

Multi-cloud forces you to generalize certain concepts, e.g. security groups
What we learned: Certifications

Existing certifications

- ISO 27001 certified some of our environments
- Cloud Foundry certified 2016/2017

Topics remaining

- Separation of duties
- Credentials rotation: CredHub to the rescue

Here be dragons: There’s a lot of work hidden

Topics can be either solved with technology or process; process-only solutions might bite you
What’s next for SAP Cloud Platform and Cloud Foundry

SAP Cloud Platform

• Expand our *multi-cloud* strategy
• Ship more *SAP apps and services* via SAP Cloud Platform CF
• Continue to *contribute more* to Cloud Foundry open source

Cloud Foundry: Open Source Stays Dynamic

• Cloud Foundry and *Containers*:
  • Especially: Relation of Cloud Foundry and *Kubernetes*
  • *Co-innovation* in both ecosystems?
• *API Management*
One more thing

Register for our trial

https://blogs.sap.com/2017/05/16/sap-cloud-platform-trial-now-includes-cloud-foundry

![QR Code](https://example.com/qrcode)
And another: One more thing

We Are Hiring!
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