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OCP SUMMIT

How OCP support ING Bank (Poland) to reduce TCO and improve user experience

Jaroslaw Sobel, IT Architect, ING Bank

Mikolaj Kujawa, IT Expert, ING Bank

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Agenda

1. Introduction

2. About ING Bank Slaski S.A.

3. OCP – stage 1

   - „GoogleLike" (PoC internal code name) infrastructure concept
   - Yosemite platform
   - New architecture design

4. OCP – stage 2 (Citrix environment)

   - Where were we – Citrix platform
   - Main goals
   - Tests (and results)
   - What we achieved and where are we now
   - Pros and Cons

5. Questions

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Introduction

Jaroslaw Sobel
IT Architect

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Mikolaj Kujawa
IT Expert

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ING Bank Slaski S.A.

About ING Group

- ING is a global financial institution with a strong European base, offering banking services through its operating company ING Bank. The purpose of ING Bank is empowering people to stay a step ahead in life and in business. ING Bank's more than 51,000 employees offer retail and wholesale banking services to customers in over 40 countries.

- ING Group shares are listed on the exchanges of Amsterdam (INGA NA, INGA.AS), Brussels and on the New York Stock Exchange (ADRs: ING US, ING.N).

- Sustainability forms an integral part of ING's corporate strategy, which is evidenced by ING Group shares being included in the FTSE4Good index and in the Dow Jones Sustainability Index (Europe and World), where ING is among the leaders in the Banks industry group.

- As at end-2016, ING serves more than 35 million customers.

More detailed information can be found on ING.com.

About ING Bank Śląski

We have been present in the Polish market since 1989. We offer services for individual clients, entrepreneurs, institutions and corporates. We manage funds entrusted, credit business activity and provide financial services for factoring and lease. We have been listed on the Warsaw Stock Exchange and members of the WIG 30 and Respect Index since their beginning.

History of ING Bank Slaski

- **11 April 1988**
  - Ordinance of the Council of Minister on establishing Bank Slaski in Katowice.
- **1 February 1989**
  - Bank Slaski in Katowice commences its operations.
- **18 October 1991**
  - Transformation of Bank Slaski from a state-owned bank into a joint stock company (100% owned by the State Treasury).
- **3 September 1993**
  - Securities Commission consents to public trading of Bank Slaski S.A. shares.
- **13 January 1994**
  - ING acquires 2.4 million shares in the Bank, that is 25.9% of its capital stock.
- **25 January 1994**
  - BSK SA shares are quoted for the first time on the Warsaw Stock Exchange, reaching a record price of PLN 675.
- **18 July 1996**
  - ING acquires 671,184 shares.
- **24 July 1996**
  - ING acquires 1,937,000 shares, thus becoming the owner of 54.08% of the Bank's capital stock, On December 31, 1998, ING Bank N.V. held 54.98% of BSK S.A.'s capital stock.

- **9 March 2001**
  - Announcing the tender offer for sale of BSK S.A. shares by ING Bank N.V.
- **23 April 2001**
  - Completion of the tender offer, as a result of which ING Bank N.V. purchases additionally 1,365,782 shares. The stake of ING constitutes 74.73%. of total number of BSK S.A. shares and the same percentage of total votes at the General Shareholders Meeting.
- **1 August 2001**
  - As a result of SE transactions ING Bank N.V. holds 82.81% shares and the same percentage of total votes at the General Shareholders Meeting.
- **6 September 2001**
  - Bank Śląski, being a member of the ING Group and implementing its strategy, initiates activity under the new name of ING Bank Śląski S.A.

The full history available at our website: http://en.ingbank.pl/

About ING Bank Slaski

Clients
4.3 million

Loans
PLN 78.6 billion

Term deposits
PLN 94.7 billion
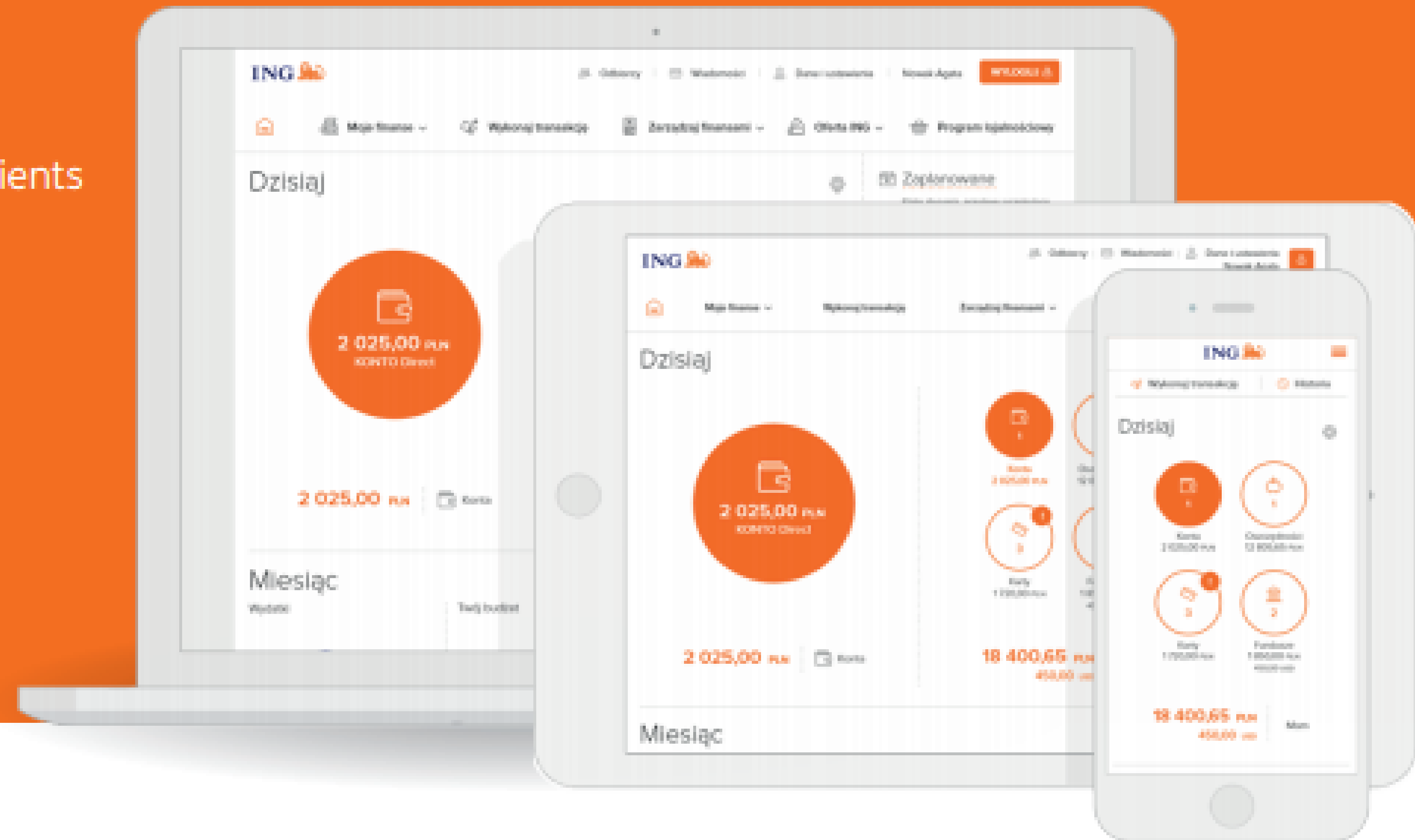
Employees
8025

Branches
384

ATMs
1145

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Innovations

Mobile application downloads:

2 million retail clients

56 thousand corporate clients
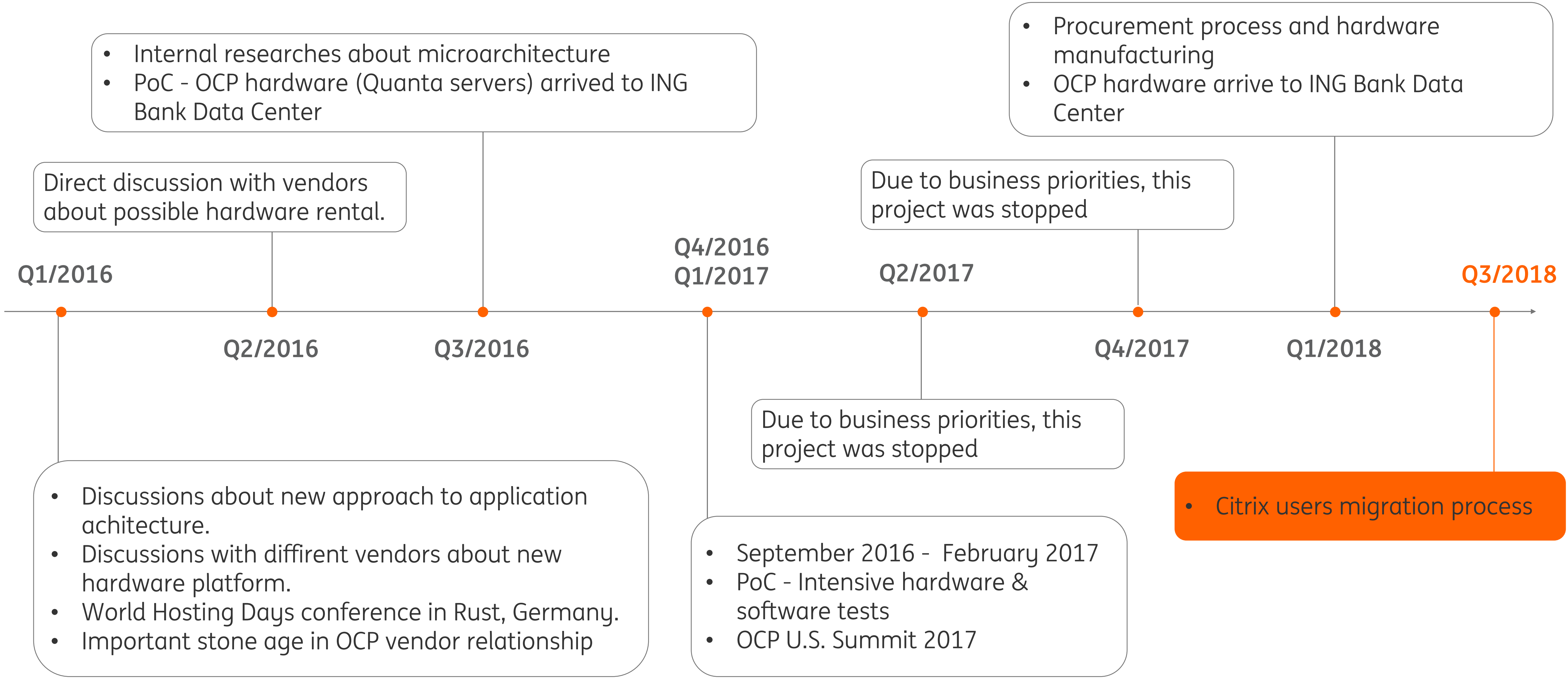
new internet banking system

Moje ING

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IT Awards

- **September 2016** - ING Bank Śląski received title of "IT Leader of 20 years" in the "Banking and Finance category" in the competition organised by Computerworld monthly.
- **September 2015** – main prize granted to ING Bank Śląski in the Banking and Finance Category in the IT Leader 2015 competition organised by Computerworld monthly
- **June 2015** – Portfel Wprost 2015 award for ING Bank Śląski in the "Internet Banking and Mobile Applications category"
- **June 2015** – Mirosław Forystek, Bank Executive Director responsible for the IT Division, among finalists of the European CIO of the Year 2015 Awards
- **December 2014** – Mirosław Forystek, Bank Executive Director responsible for the IT Division, recognised as CIO of 2014 by the CIO Club
- **December 2014** – 2nd place in the competition for new technologies, in the Internet category, organized by Komputer Świat magazine
- **November 2014** – award for ING Bank Śląski for the ING Electronic Wallet in the category of Best Software/ IT System in Poland in 2014 granted at the Central European Electronic Card Conference

- **December 2013** – award for ING Bank Śląski the implementation of contactless ATMs, granted in the category of Best Software/ IT System in Poland in 2013 to service card systems at the Central European Electronic Card Conference
- **November 2013** – Special Award for ING Bank Śląski for the protection of customer data and the model implementation of Recommendation "D" of the Polish Financial Supervision Authority granted in the IT@Bank 2013
- **December 2012** – award for the pilots of NFC mobile payments, granted in the category of Best Software/ IT System in Poland in 2012 to service card systems at the Central European Electronic Card Conference
- **October 2012** – special Green IT award granted to ING Bank Śląski in the IT Leader 2012 competition organised by Computerworld monthly
- **April 2012** – award for ING Bank Śląski for its ING BankMobile application for iPhones in the Generation Mobile 2012 contest

..., „Best Bank", „Top Employer", this and many other awards available on:
http://en.ingbank.pl/company-profile/prizes

ING Bank Slaski & OCP history

- **Q4 2015**
  - Discussions about new approach to application achitecture.
- **Q1 2016**
  - Discussions with diffirent vendors about new hardware platform.
- **March 2016**
  - World Hosting Days conference in Rust, Germany.
  - Important stone age in OCP vendor relationship
- **May 2016**
  - Direct discussion with vendors about possible hardware rental.
- **June – September 2016**
  - Internal reserches about microarchitecture.
- **September 2016**
  - PoC - OCP hardware (Quanta servers) arrived to ING Bank DataCenter
- **September 2016 - February 2017**
  - PoC - Intensive hardware & software tests

- **March 2017**
  - OCP U.S. Summit 2017
- **April 2017**
  - Due to business priorities, this project was stopped
- **Q4 2017**
  - We back to OCP hardware but for other purpouse
- **Q1 2018**
  - Procurment proces and hardware manufacturing
- **May 2018**
  - OCP hardware arrive to ING Bank DataCenter
- **June/July 2018**
  - Preparing to go to production
- **August 2018**
 - Citrix users migration process

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ING Bank Slaski & OCP history

- Internal researches about microarchitecture
- PoC – OCP hardware (Quanta servers) arrived to ING Bank Data Center

- Procurement process and hardware manufacturing
- OCP hardware arrive to ING Bank Data Center

Direct discussion with vendors about possible hardware rental.

Due to business priorities, this project was stopped

Q4/2016
Q1/2017

Q1/2016   **Q2/2016**   **Q3/2016**   **Q2/2017**   **Q4/2017**   **Q1/2018**   **Q3/2018**

Due to business priorities, this project was stopped

- Discussions about new approach to application achitecture.
- Discussions with diffirent vendors about new hardware platform.
- World Hosting Days conference in Rust, Germany.
- Important stone age in OCP vendor relationship

- September 2016 – February 2017
- PoC – Intensive hardware & software tests
- OCP U.S. Summit 2017

- Citrix users migration process

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OCP – stage 1

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„GoogleLike" (PoC internal code name) infrastructure

Concept
- Small and „cheap" PCs/servers
  - One CPU
  - Better performance
- Open Hardware – „*Open Compute Project*"
  - Designed by Facebook and Quanta
  - Supported by: Google, Microsoft, etc.
- Standardized componentes – racks, servers, etc.
- No virtualization, only „bare metal"
- Contererization (Docker)
- Microservices
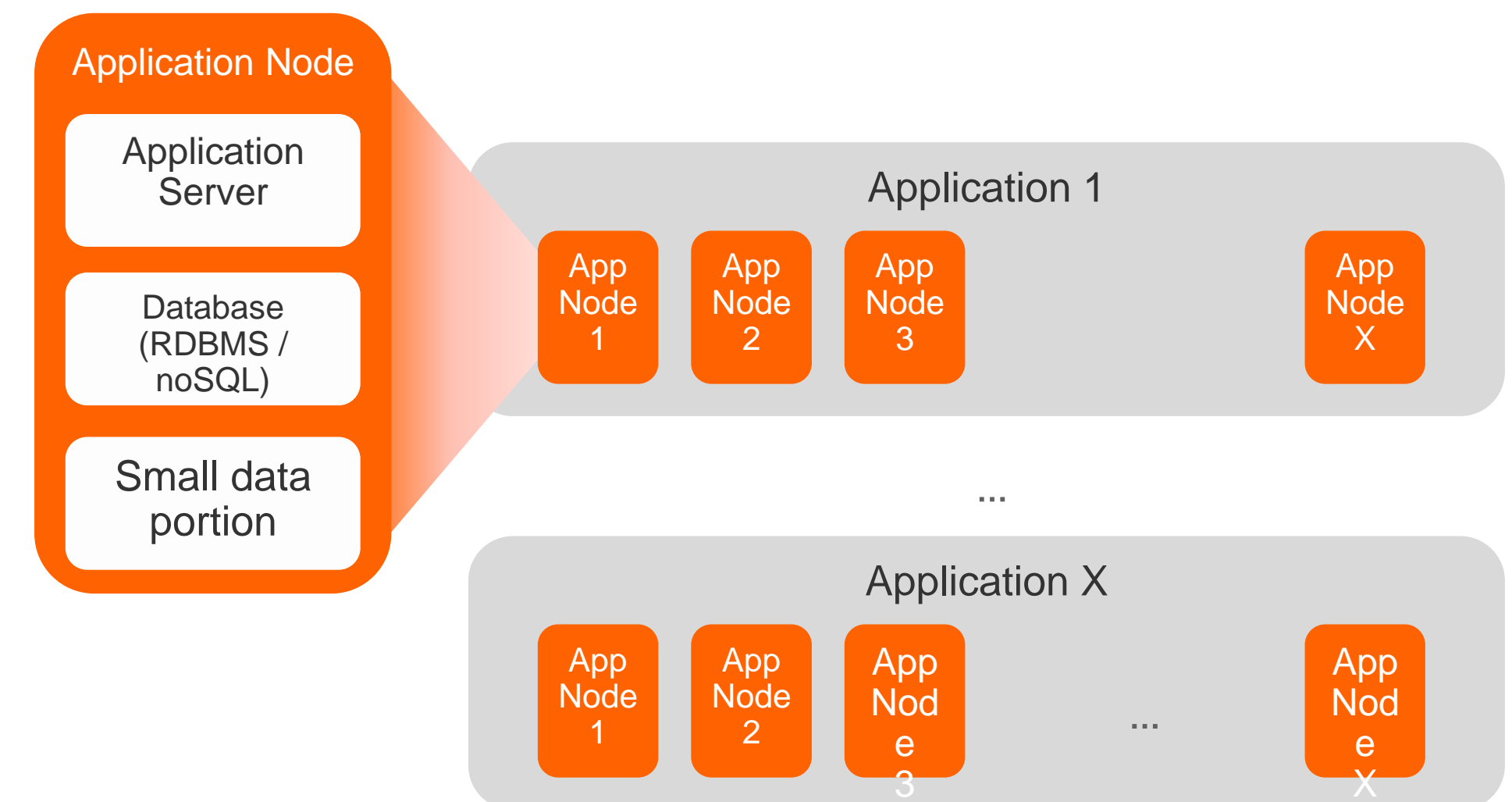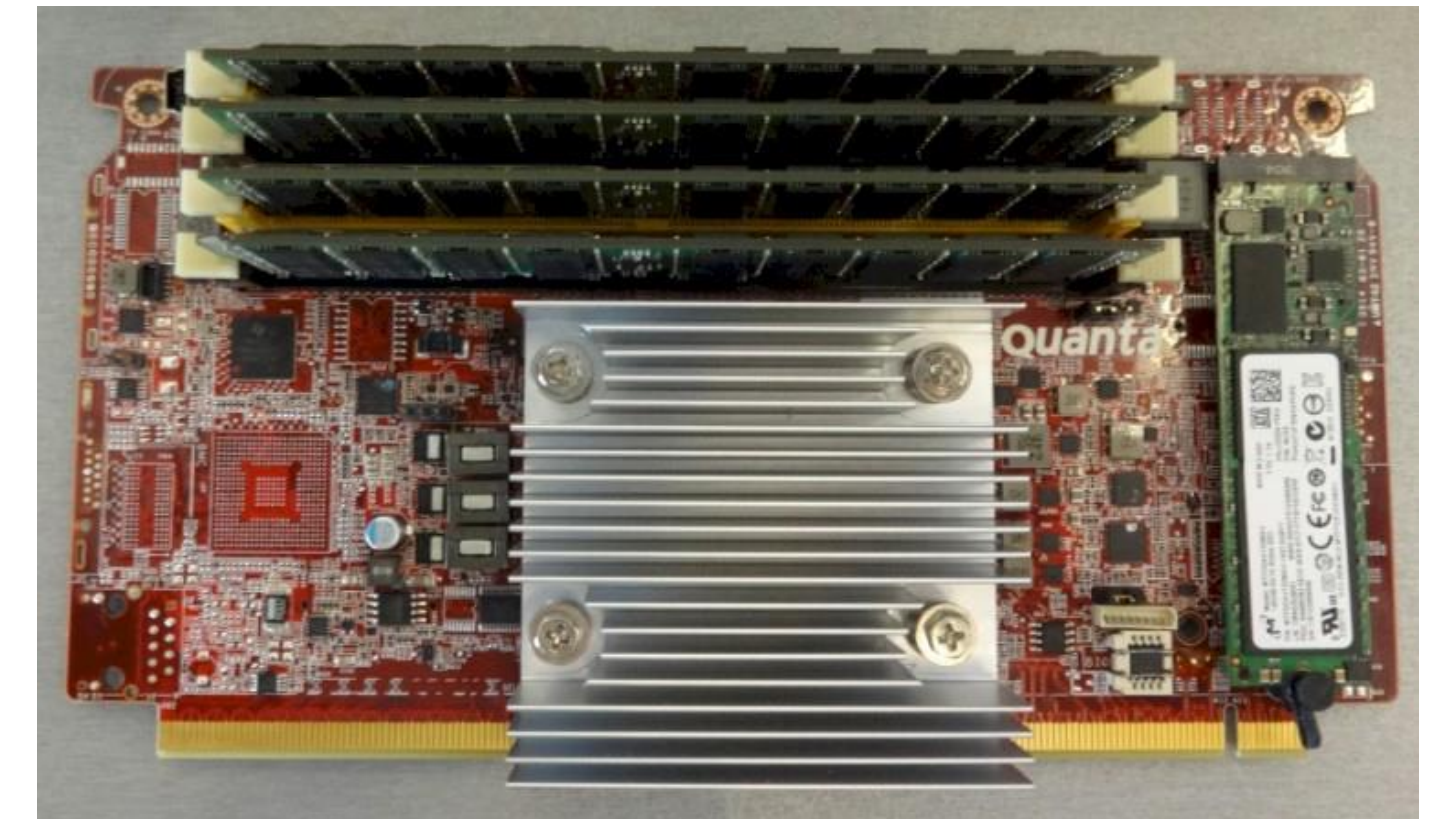
Facebook Yosemite servers

On March 2015 Facebook announced:
Introducing "Yosemite": the first open source modular chassis for high-powered microservers

In hardware design, there are two approaches to solving the vast computing needs of a site like Facebook. There's the approach of "scale up" — building ever-increasing amounts of computing power in a given system. Or you can "scale out," building an ever-increasing fleet of simple systems, each with a moderate amount of computing power.

https://code.fb.com/core-data/introducing-yosemite-the-first-open-source-modular-chassis-for-high-powered-microservers/

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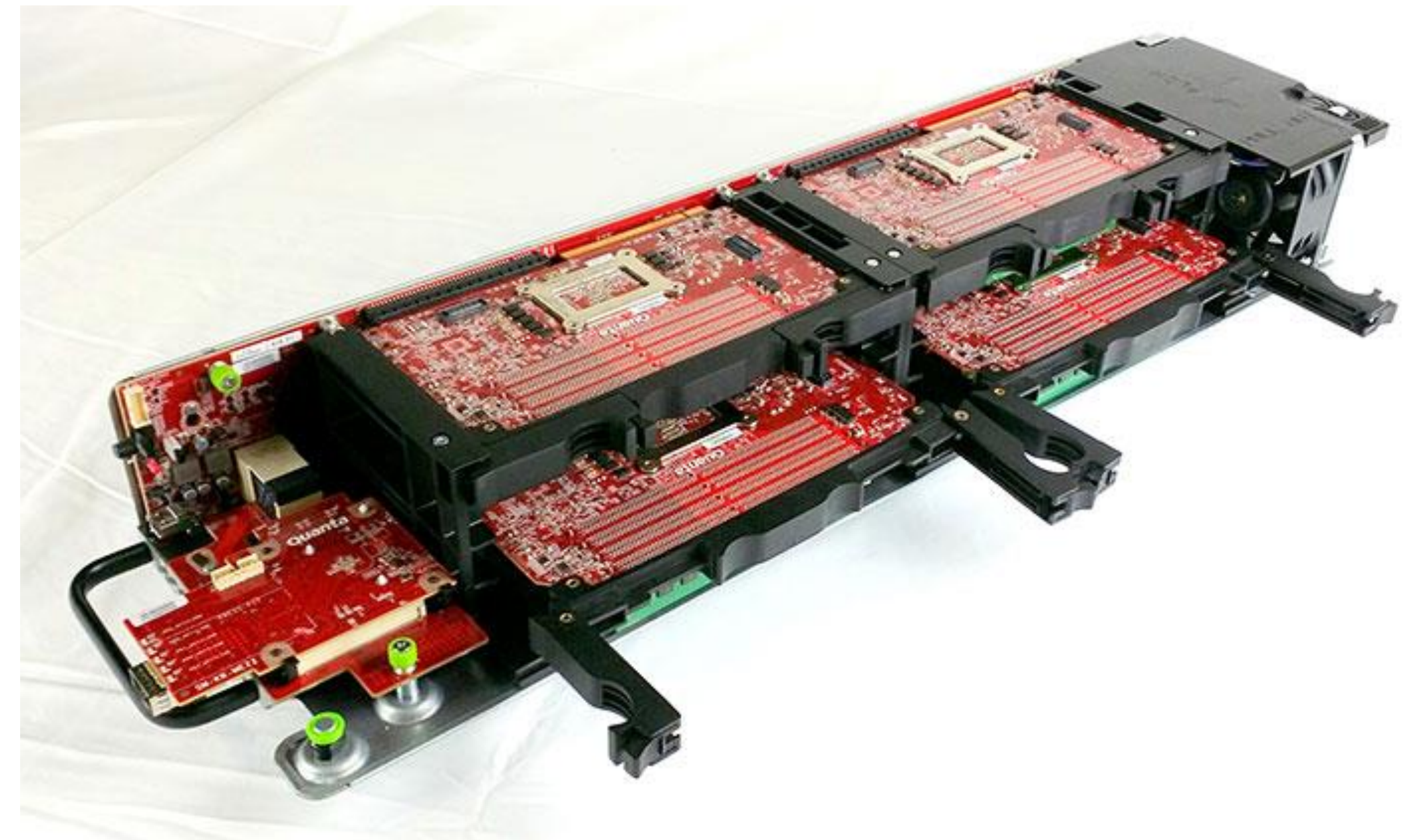
What we tested – QCT Rackgo X Yosemite Valley

Rackgo X Yosemite Valley - High-Density 2U12N Compact OCP 1S Server
- New Generation Platform with enhanced performance
- Multi-Host Networking Aggregation
- Ultra-Dense Chassis Design
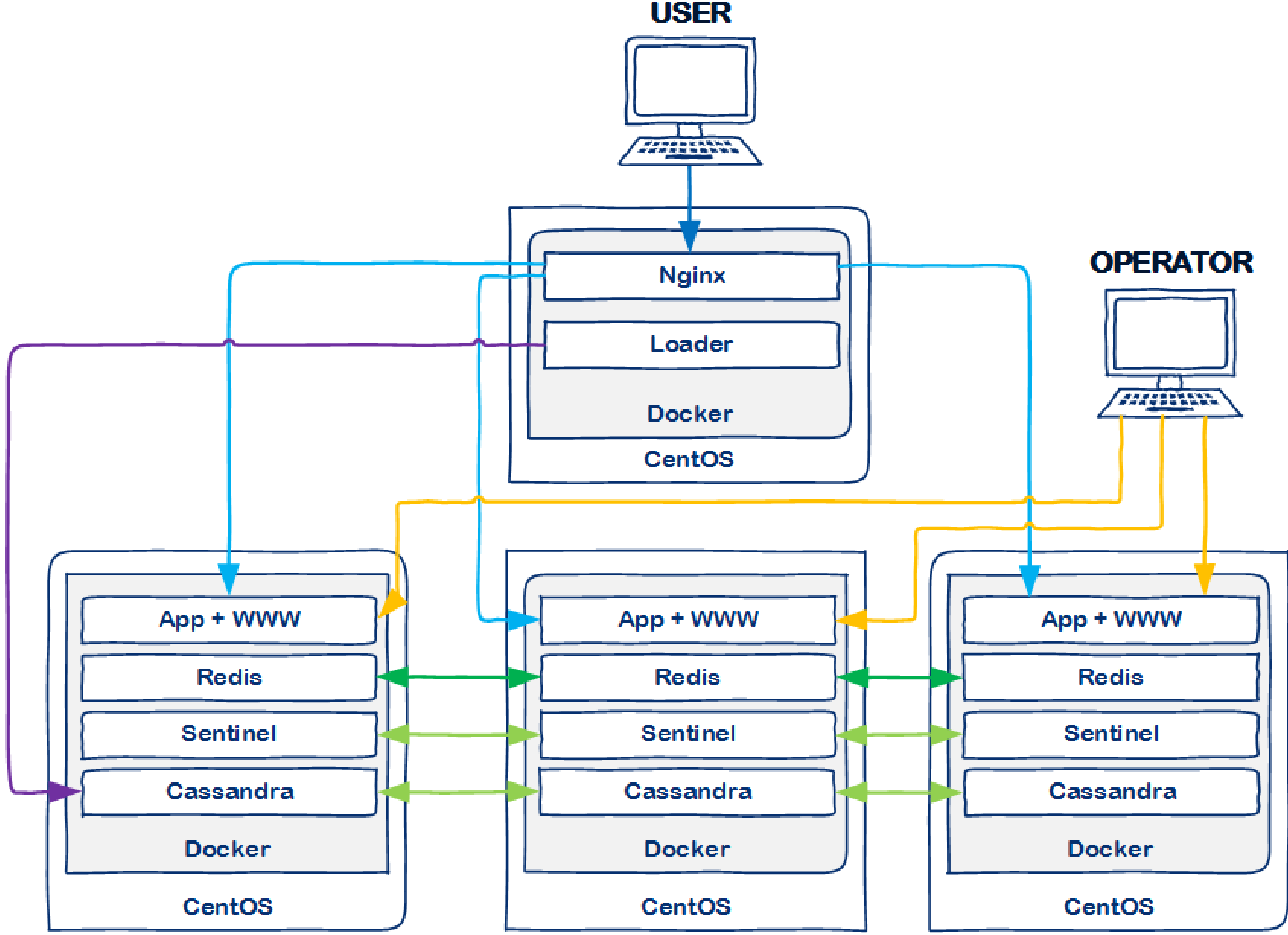- Open Rack v2 Compatible

Unboxing

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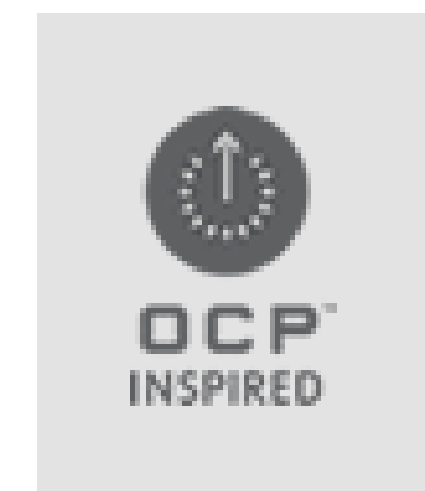
Unboxing

Unboxing
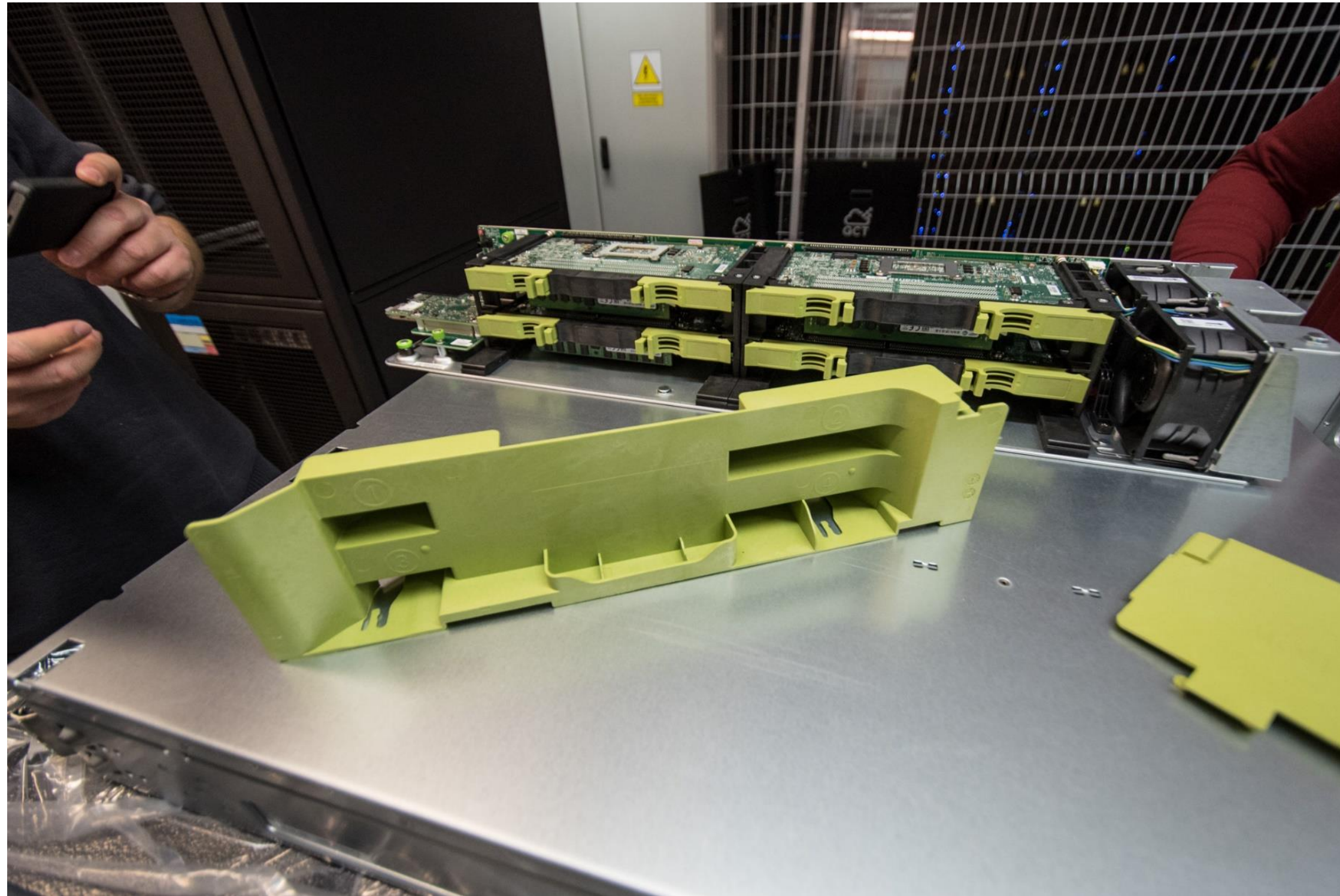
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PoC – test application

PoC – software

- Application architecture principles:
  - Microservices
  - 3 DataCenters
  - Load balancing and Service discovery
- Management layer (build in house – ING)
  - **HAL** – Hardware Abstraction Layer
    - *Tools: Python, MongoDB*
    - Hardware layer management (OpenBMC over IPMI)
    - Hardware monitoring (status, power, sensors, etc) OS management (provisioning, etc)
  - **Dave** – containter manager
    - *Tools: Python, MongoDB*
    - Conteinter privisioning – for whole application (in one)
    - Conteinter HA
  - **WebGUI** – GUI dla HALa i Dave'a
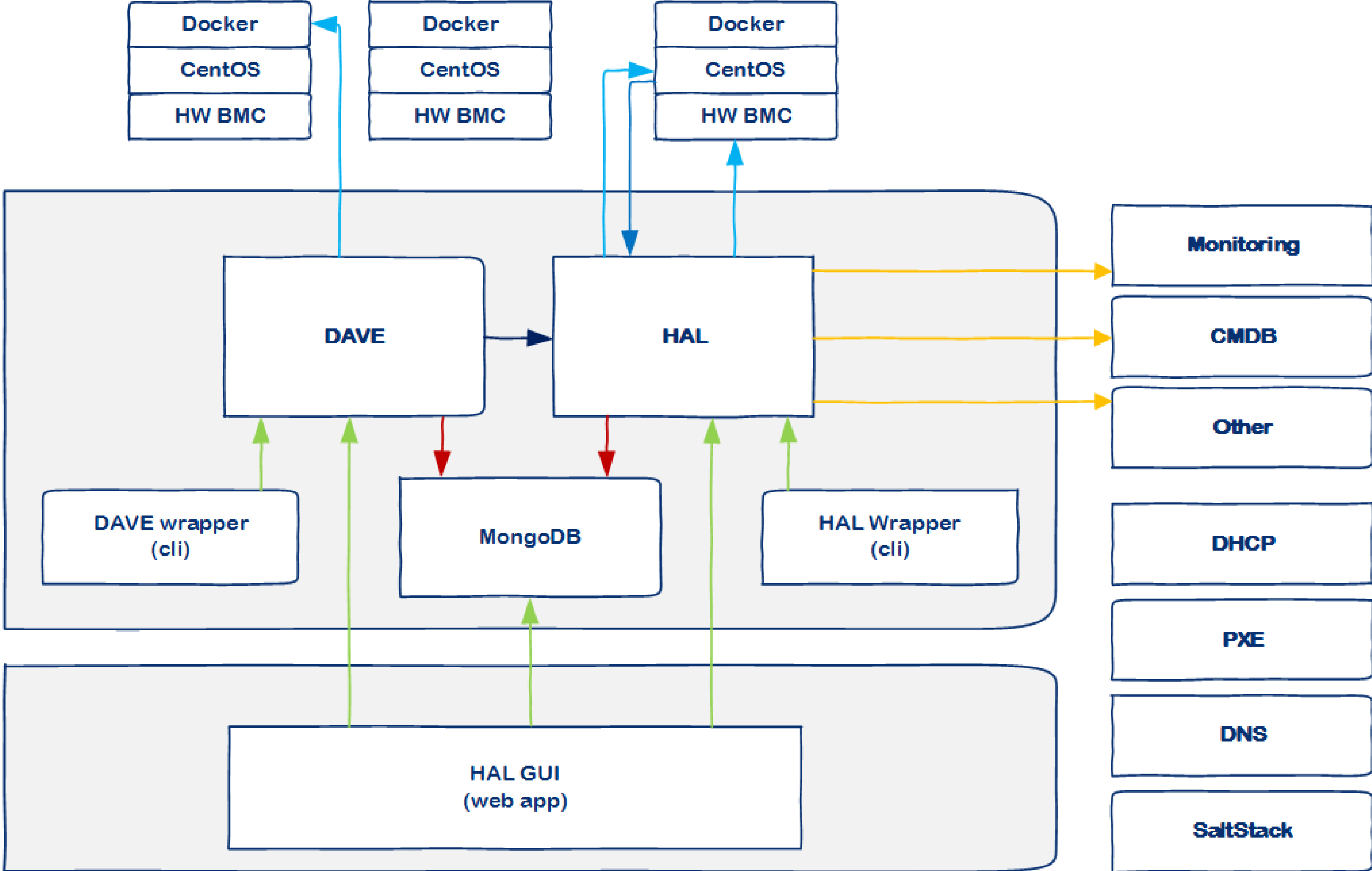   - *Tools: PHP, jQuery, responsive CSS*

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PoC – general overview
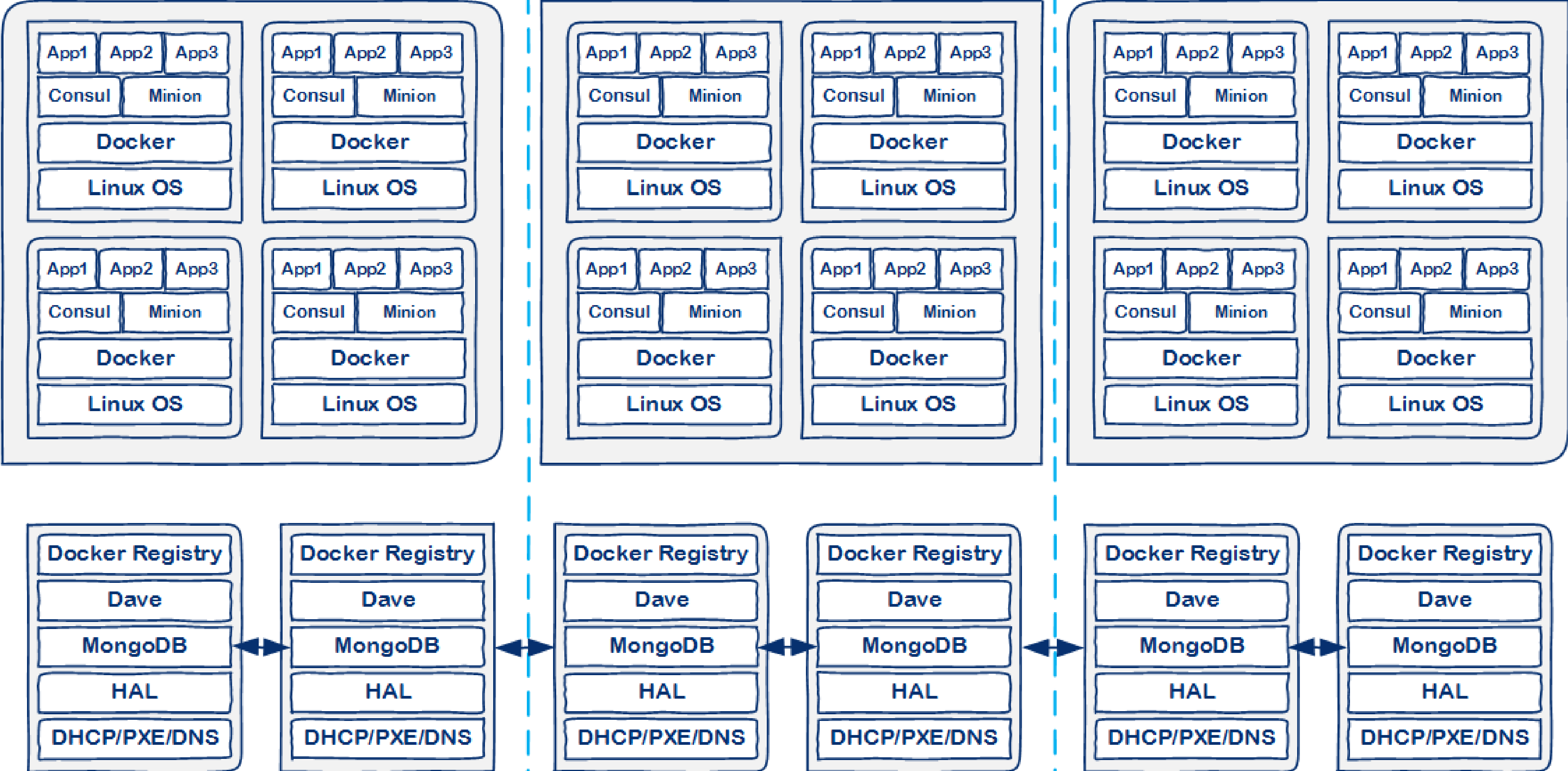
PoC – microserver architecture
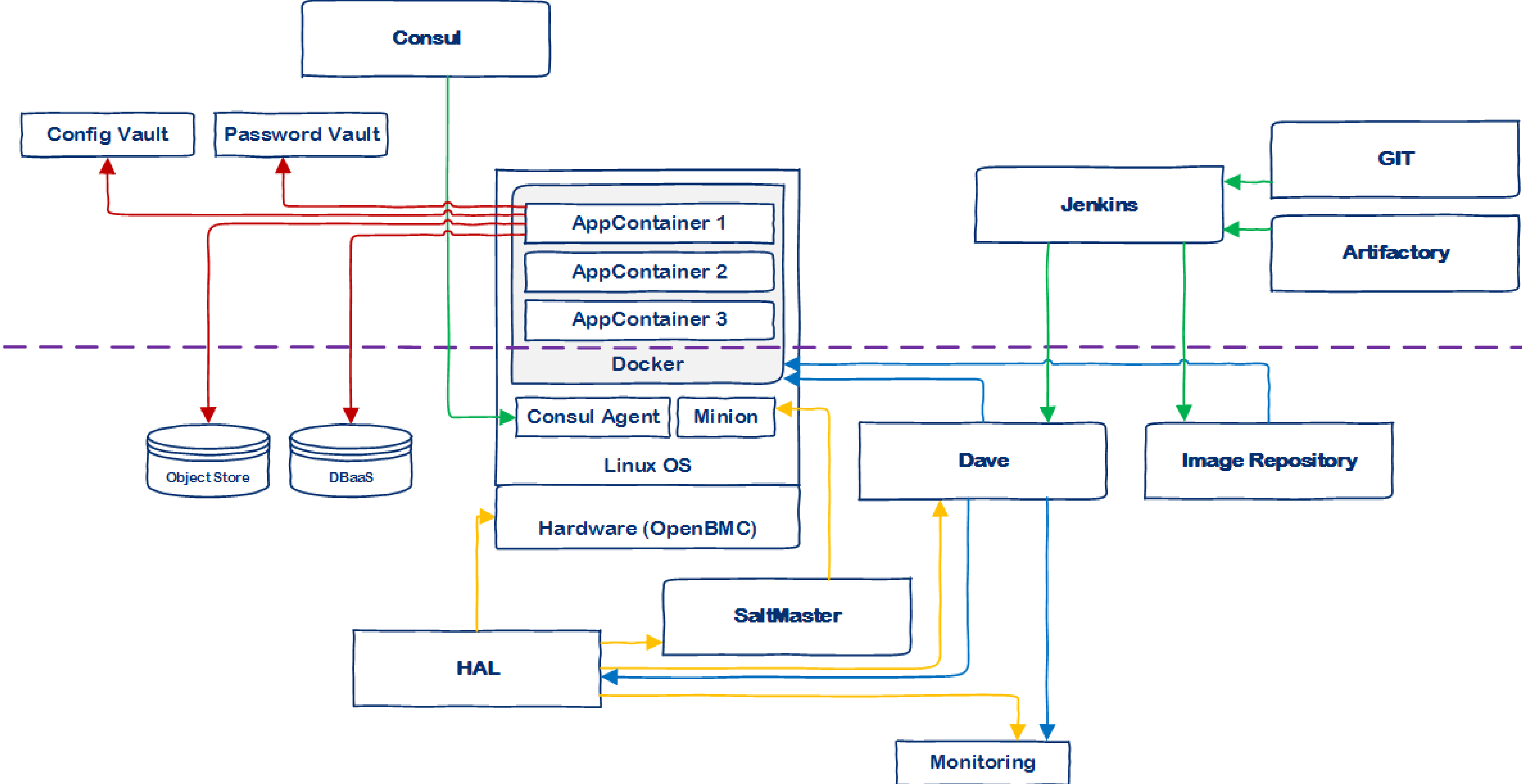
PoC – HAL (hardware management)

PoC – summary

What we achived in infrastructure layer:

- Security by design
  - Stateless servers
  - No SSH access
  - Live Linux
  - Network segmentation – (ie. SDN)
- Fault tolerante/acceptance
- „Chaos Monkey" ready
- AI & Machine learning – HAL & Dave

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OCP – stage 2 (Citrix environment)

Citrix XenApp/XenDesktop

Citrix XenApp/XenDesktop is a app/desktop virtualization software platform that allows multiple users to access and run Microsoft Windows applications/desktops that are installed at a centralized location separate from the devices from which they are being accessed.
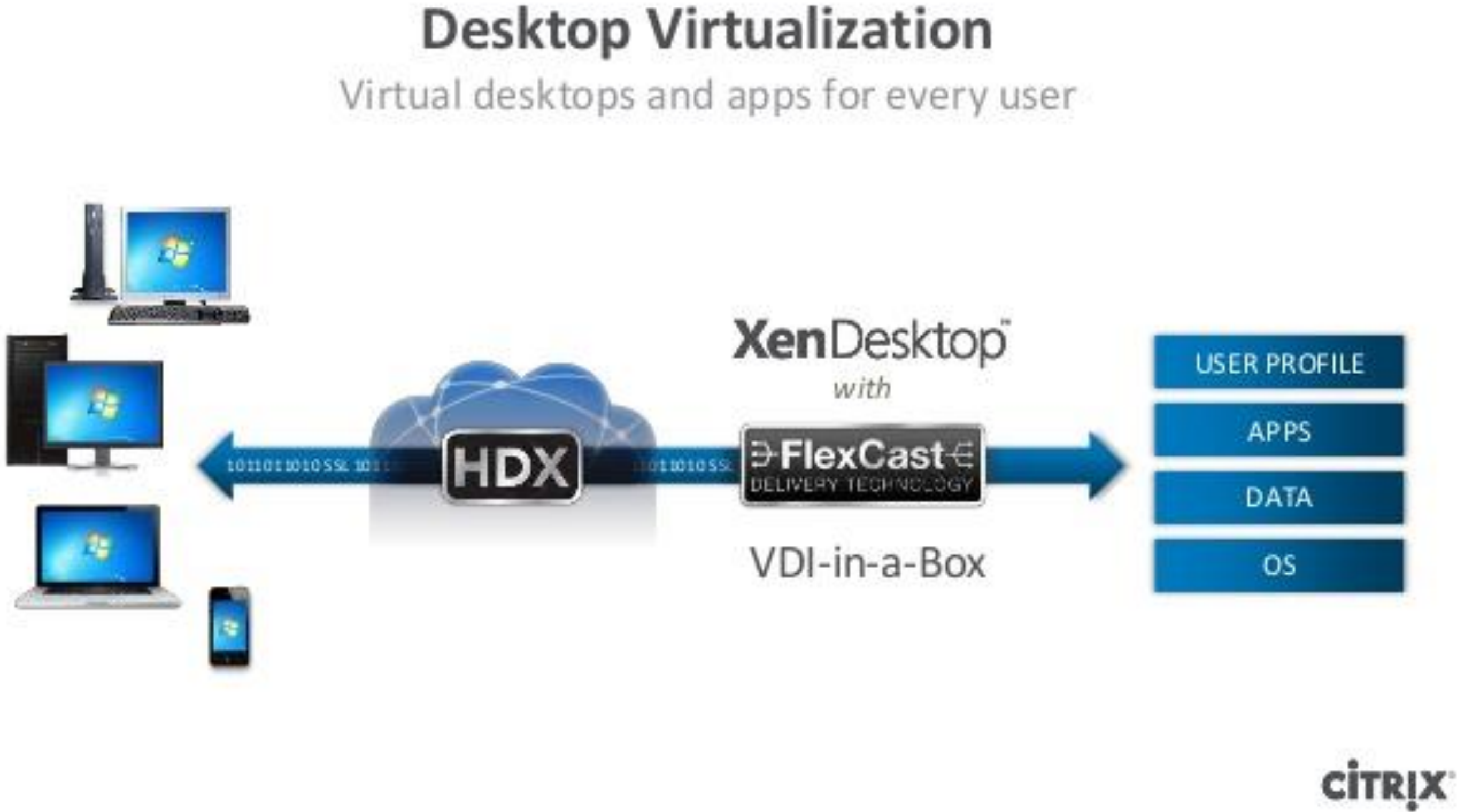
Citrix platform - where were we?

Trend on market (in application/desktop virtualization area)
going from virtual to physical (e.g. HP Moonshot)

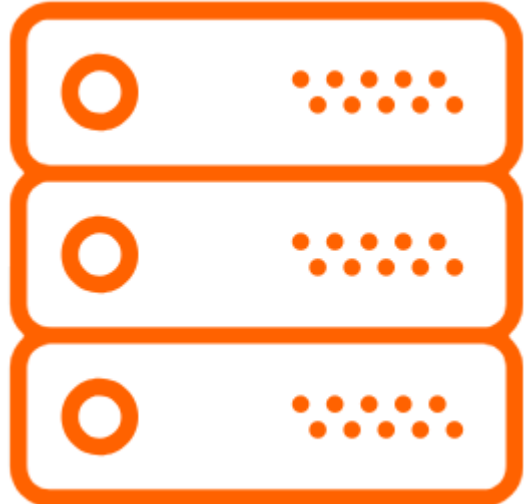**Where were we?** We planned migration of Citrix XenDesktop environment

444
Virtual Machines

>

168
Physical Servers

Windows Server 2008 R2

Windows Server 2016

New Operating System → higher numer of processes in the background → higher storage footprint → new resources needed

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Main goals

- Give better user experience

- Meet the requirements of Windows Server 2016 migration
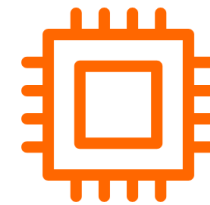
- Improve TCO

- Make the evnironment simpler
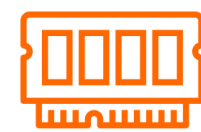
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How we tested OCP servers?

Test sample:

Yosemite (1 monolake node)		Current Blade Servers
1x8core Intel Xeon CPU-D 1541		2x8core Intel E5-2650v2
64 GB		384 GB
128 GB (local)		Midrange Storage Array

Benchmarking tool: **LoginVSI**

https://www.loginvsi.com/products/login-vsi

„Login VSI is the industry standard load-testing tool for virtual desktop environments. Login VSI will generate a large number of synthetic users to test, and to protect, the performance and scalability of new and existing VDI, SBC and DaaS deployments."

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Test results

VSI max (information on the maximum capacity of your virtualized desktop environment)
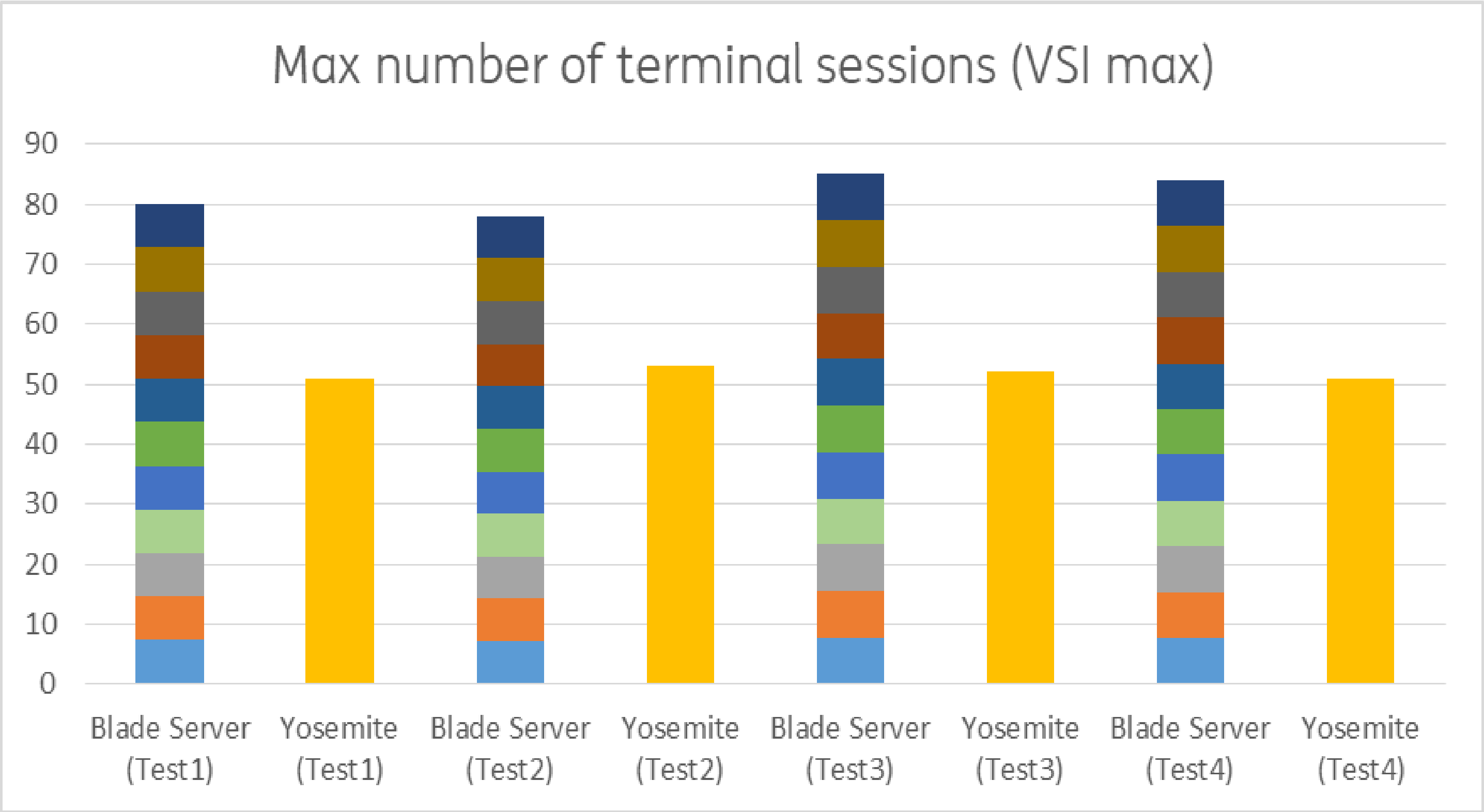https://www.loginvsi.com/blog-alias/login-vsi/481-calculating-maximum-virtual-desktop-capacity-vsimax-explained

Yosemite (1 Monolake Node)
VSImax ~52 users

Current Blade Servers (11 VMs)
VSImax ~82 users

! ! ! With Yosemite user density is equal to 62% density from 11 VMs

All tests were performed on Windows Server 2016

Max number of terminal sessions (VSI max)

TCO savings

Due to new hardware layer and more suitable Citrix environment architecture design we were able to save about

-35% TCO

-30% OPS

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Pros and Cons

Yosemite		Current Blade Servers	
Pros (+)	Cons (-)	Pros (+)	Cons (-)
Better performance (no virtualization)	Upgrade BIOS/firmware on higher numer of devices	Universal solution	
Savings in Microsoft licensing (Standard vs DataCenter)	More port needed on physical switch	More flexibility (we can add more virtual machines if needed)	Overhead of virtualisation on CPU
Fast local SSD dirve	Diagnostic – more dificult (Server Console missing)		
Failure of one physical server → impact on 50 users session		Failure of one virtual machine → impact on 15 users sessions	Failure of one physical server → impact on 168 users

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