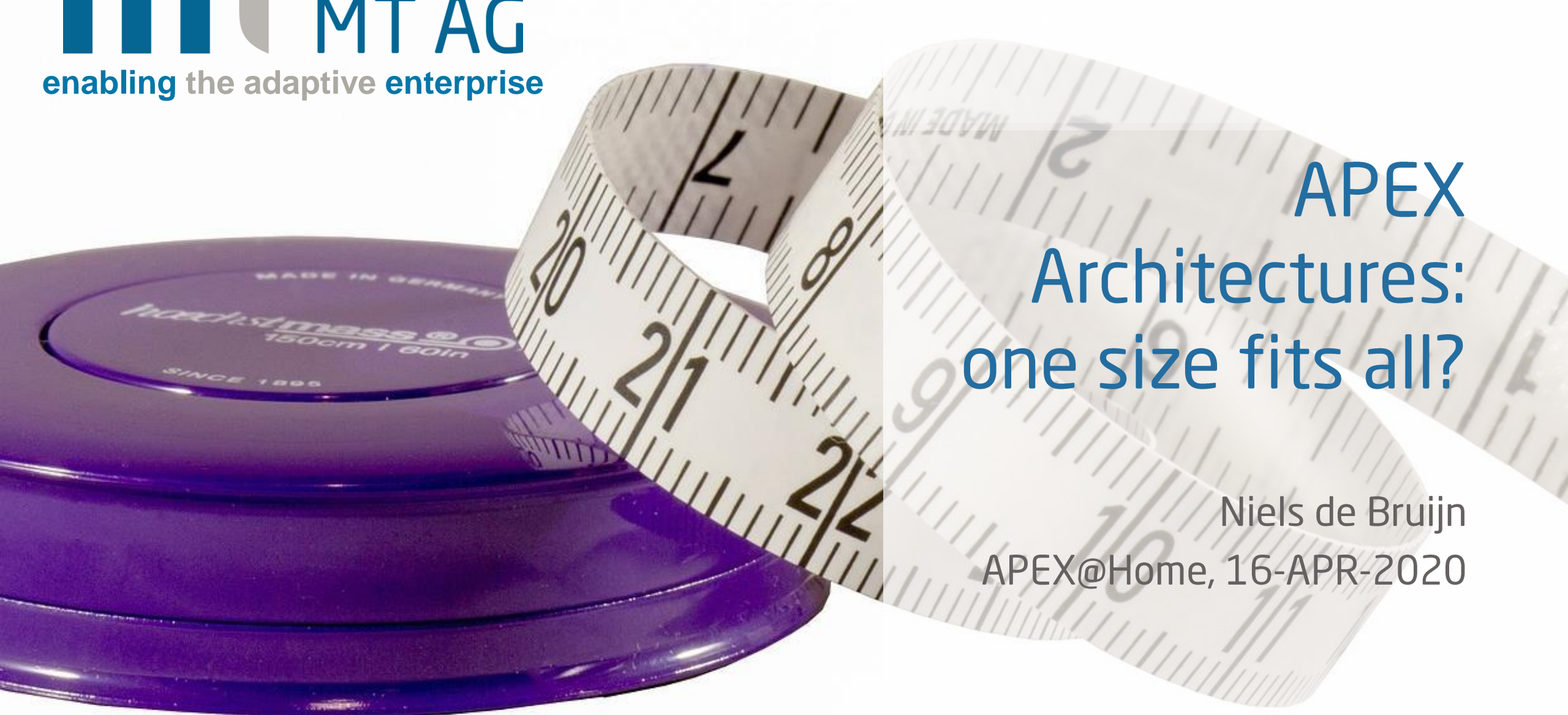# MT AG

enabling the adaptive enterprise

APEX
Architectures:
one size fits all?

Niels de Bruijn

APEX@Home, 16-APR-2020

About me

- **Niels de Bruijn, Business Unit Manager Low-Code @ MT AG**
- Dutch guy, born in 1977, married, three daughters, living in Ratingen

- Responsible for all Low-Code activity in the company
  - **Knowledge Portal: apex.mt-ag.com**

- Track record with APEX since its inception
- Oracle APEX 18 Developer Certified Professional

- DOAG e.V. - Director Development Community
- DOAG e.V. - Initiator & Conference Chair of the 3-day conference *APEX Connect* in Germany

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Visit knowledgebase.mt-ag.com

https://knowledgebase.mt-ag.com/q/apex_architectures

APEX architectures

Pre-setup APEX environment needed? Go cloudy.

Why build yourself? Get Cloudy! (< 10 minutes)

For everybody that don't want to setup the APEX environment themselves

(and can live with the fact that their data is residing outside their own network)

Options of hosting services:

- apex.oracle.com - free, but not for production; limitations like 25 MB storage, no direct access to DB, no backup

- Oracle Cloud Free Tier
  - apex.oracle.com/autonomous
  - 2 databases with each 20 GB of uncompressed user data (minus system data)
  - You need to implement a backup plan yourself
  - No activity within 7 days? Your instance will be stopped!
  - See excellent blog post series by Dimitri Gielis for more info: http://bit.ly/apexcloudblogposts

- Valid alternatives for reliable, hosted APEX environments:

maxapex.com, revion.com, skillbuilders.com, AMI on aws.com, enciva.com

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Installing yourself? Warm-up on your laptop

Laptop Installation (+/- 2 hours in total)

1. Install Oracle Database 18c Express Edition (XE)*

2. Install the latest APEX version in the PDB

3. Load the static files of APEX in the PDB

4. Configure RMAN & test backup/recover process

*) - Great blog post from Johannes Ahrends about XE 18c: https://www.carajandb.com/en/blog/2018/oracle-18-xe-and-multitenant
    - No official support from Oracle, but with the next XE version, you could transfer the PDB to the new instance. ☺

Client

Browser ⟵──────────────────⟶ Listener ⟷ EPG | Oracle RDBMS with APEX

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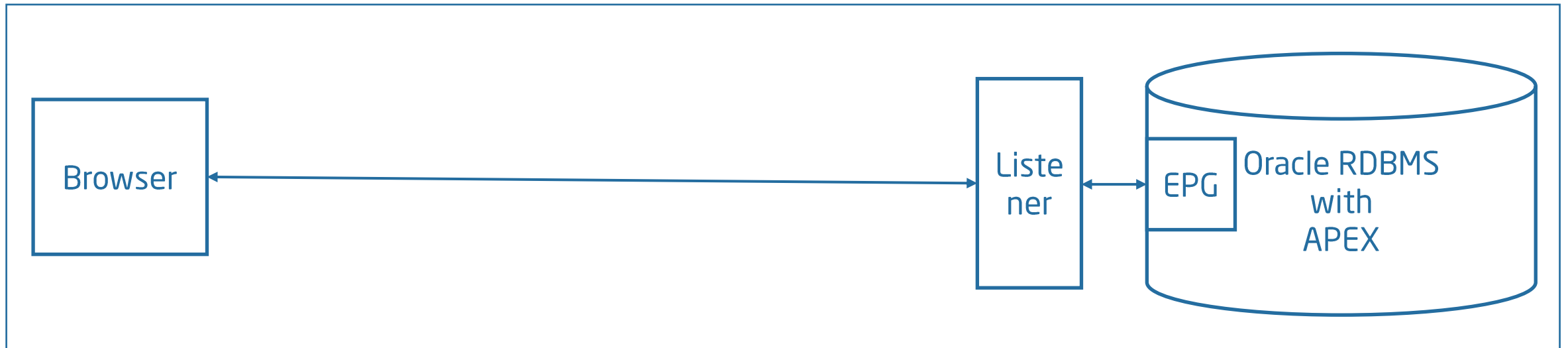
Warmed up? Let's take it to the next level

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Minimal Server Installation (+/- 8 hours in total)

1. Get your Oracle Linux server with root access (buy HW yourself or pay +/- 13$/month for hosting)
   - Alternatively, install CentOS and convert to Oracle Linux (see: https://linux.oracle.com/switch/centos)
2. Install Oracle RDBMS, APEX, Tomcat, configure & deploy ORDS
3. Configure RMAN & test backup/recover process
4. Install SSL certificate in Tomcat

Client

Server

Browser

HTTPS

Oracle REST Data Services

Tomcat

Listener

Oracle RDBMS with APEX

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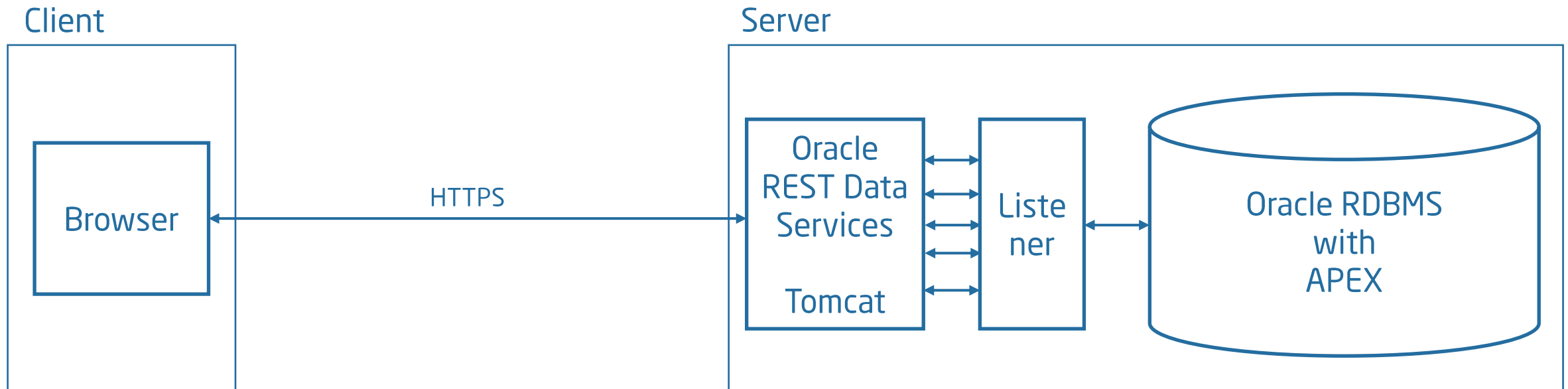
Recommended Server Installation (+/- 9 hours in total)

1. Same steps as seen on previous slide
2. Install proxy server in front of ORDS
3. Install SSL certificate on the proxy server
4. Disable direct communication with Tomcat

Client

Linux/Windows Server

Database Server

Browser

HTTPS

Proxy Server like Apache Web Server, NGINX or IIS

AJP or HTTP

Oracle REST Data Services

Tomcat

JDBC

Listener

Oracle RDBMS with APEX

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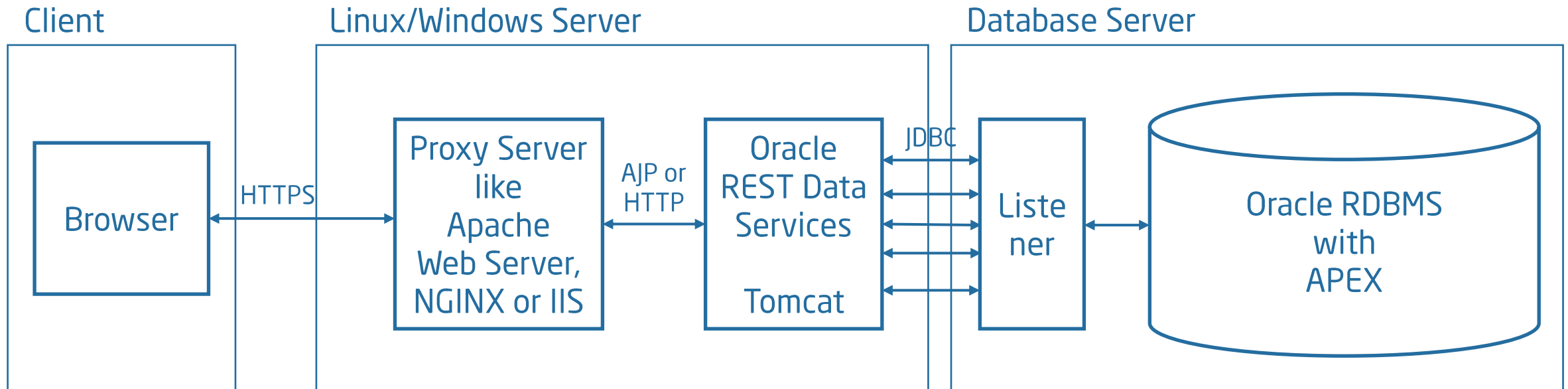
Adding
Single Sign-On
for my APEX apps

———

For the sake of

- Security

- Productivity

Alternative 1: Adding SSO using OAuth2/OpenID Connect

- Azure AD as authentication provider gets more and more adopted
  - Users are already familiar with Azure AD because of Office 365
  - Azure AD has some great features like application proxy, self-registration and 2-factor authentication
- Step-by-step guide on https://knowledgebase.mt-ag.com/q/apex_sso_oauth2
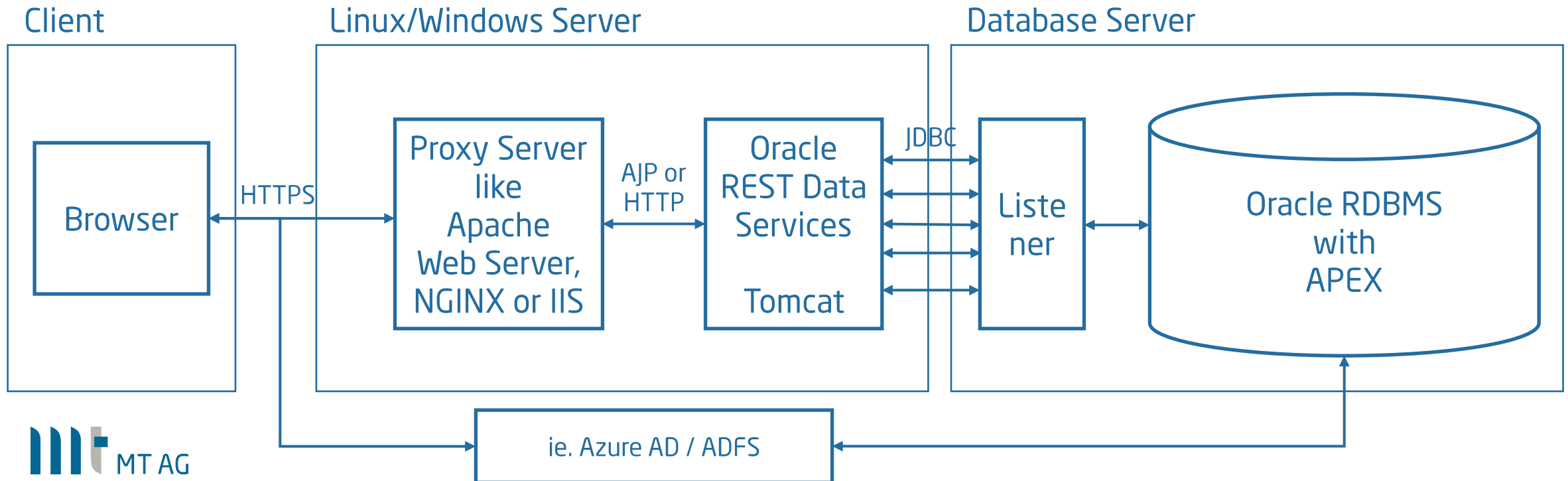
Alternative 2: Adding SSO using Kerberos

- For internal APEX environments with Windows AD accounts and no ADFS/Azure AD
- Step-by-step guide on https://knowledgebase.mt-ag.com/q/apex_sso_kerberos
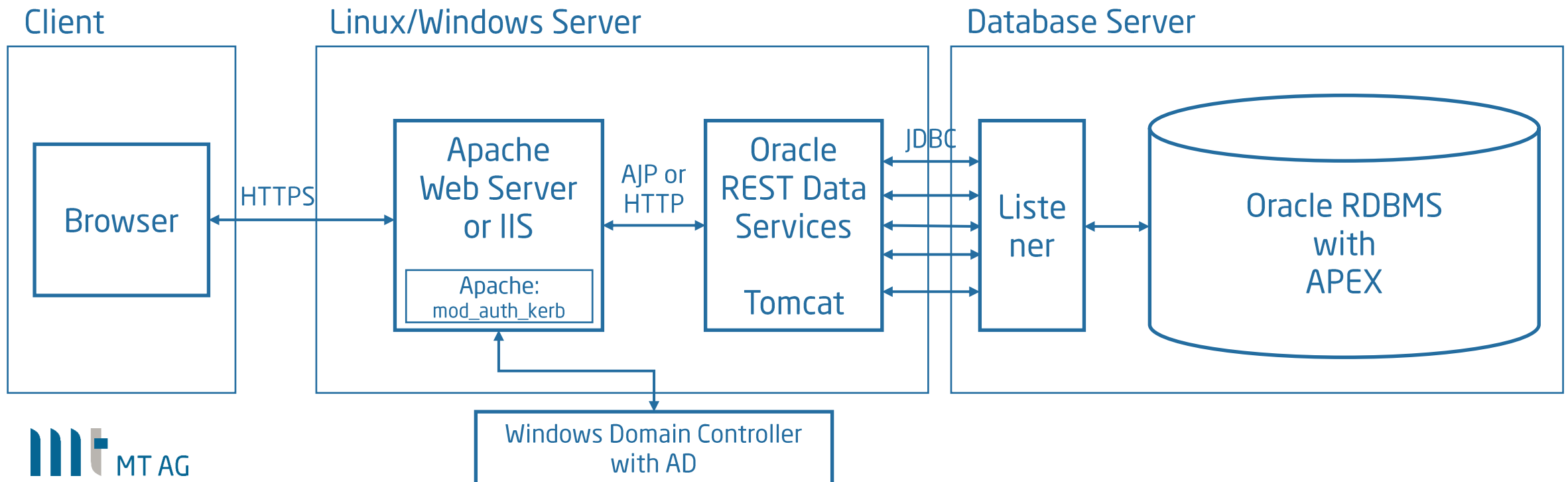
Alternative 3: Adding SSO using SAML2

- It works, but I would prefer using OAuth2
- Step-by-step guide on https://knowledgebase.mt-ag.com/q/apex_sso_samlv2

Client

Linux/Windows Server

Database Server

Browser

HTTPS

Apache
Web Server

Apache:
mod_auth_mellon

AJP or
HTTP

Oracle
REST Data
Services

Tomcat

JDBC

Liste
ner

Oracle RDBMS
with
APEX

ie. Azure AD / ADFS

App registered once; no backend communication involved

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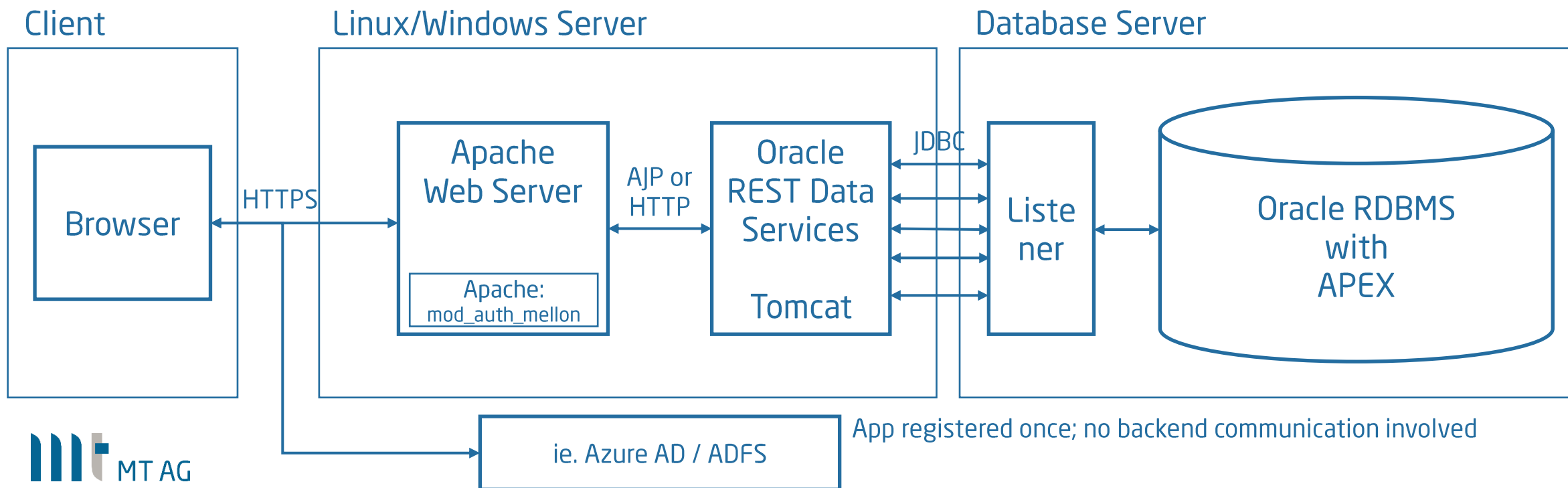
OAuth2/OpenID Connect, Kerberos or SAML2?

Here are my recommendations (in this order):

1. **OAuth2/OpenID Connect** authentication provider available?

• Use Social Login in APEX 18.1+

• Easy to get extra data during authentication (ie. cost center, city, etc.)

• Authentication provider can be both inside as well as outside the corporate network

• Supports changing authentication method in runtime (ie. if some user accounts are stored outside AD)

2. **Kerberos** as authentication method available?

• Use a proxy server like IIS or Apache Web Server

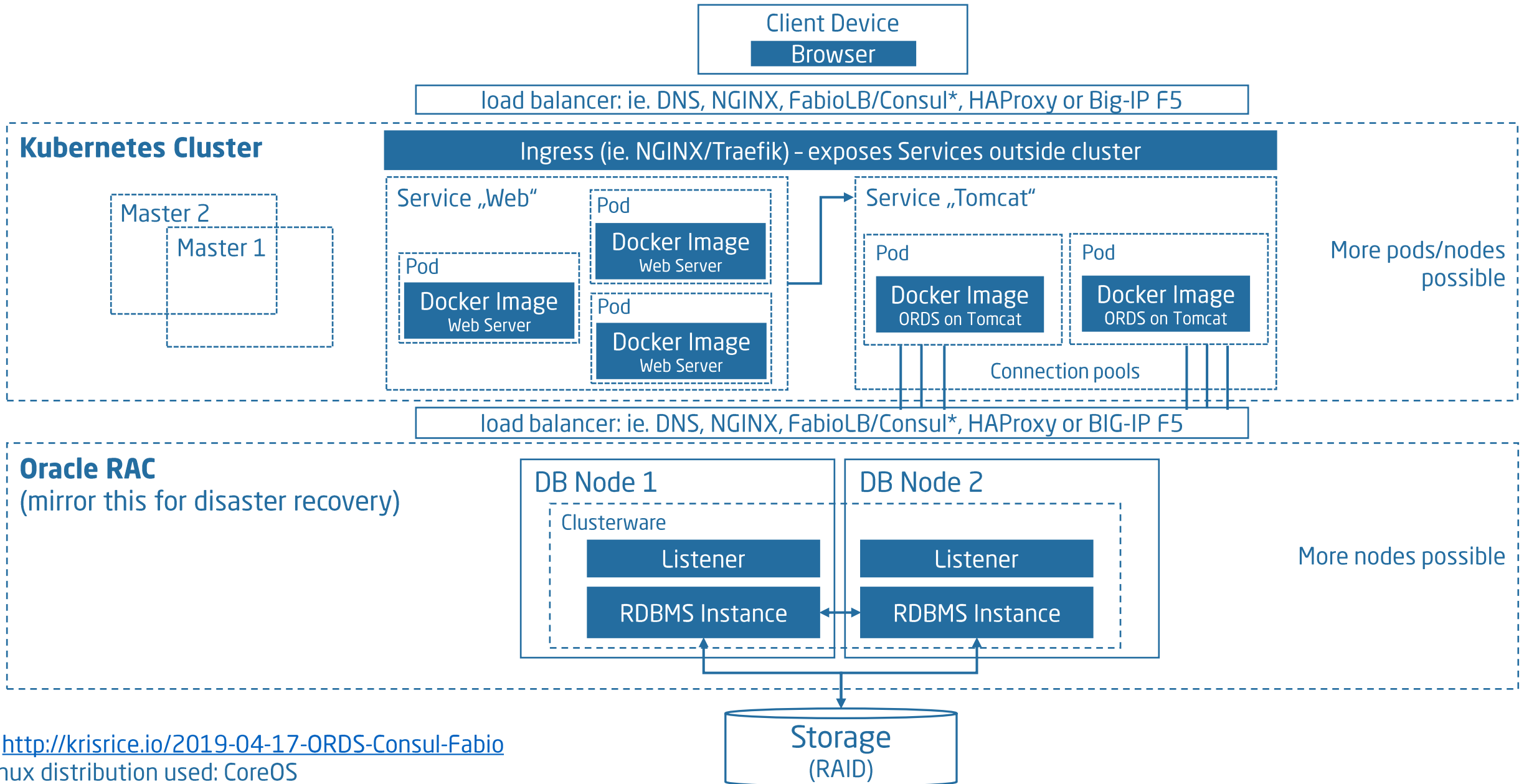• Beware of Kerberos tickets getting too big

3. **SAML2**

• Works with Apache Web Server (with mod_auth_mellon)

• Cumbersome to setup; OAuth2 is getting more adopted

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About
High Availability

About High Availability

Client Device
Browser

load balancer: ie. DNS, NGINX, FabioLB/Consul*, HAProxy or Big-IP F5

Kubernetes Cluster

Ingress (ie. NGINX/Traefik) – exposes Services outside cluster

Master 2
Master 1

Service „Web"

Pod
Docker Image
Web Server

Pod
Docker Image
Web Server

Pod
Docker Image
Web Server

Service „Tomcat"

Pod
Docker Image
ORDS on Tomcat

Pod
Docker Image
ORDS on Tomcat

Connection pools

More pods/nodes possible

load balancer: ie. DNS, NGINX, FabioLB/Consul*, HAProxy or BIG-IP F5

Oracle RAC
(mirror this for disaster recovery)

DB Node 1

Clusterware
Listener
RDBMS Instance

DB Node 2

Listener
RDBMS Instance

More nodes possible

Storage
(RAID)

*) http://krisrice.io/2019-04-17-ORDS-Consul-Fabio
Linux distribution used: CoreOS

Some random thoughts...

- Important internet facing environments should consider using another security layer up front
  - ie. Cloudfare

- Consider using Oracle Data Guard (requires Enterprise Edition) or Dbvisit for Disaster Recovery

- Have a look at another great presentation from Adrian Png around options for SSO
  - https://insum.ca/portfolio/whos-who-in-apex

- Recommended APEX@home presentations with focus on architecture and/or security
  - Bring the Light into Your Always FREE Autonomous Cloud, Dimitri Gielis
  - Social Login while Social Distancing, Martin Giffy D'Souza
  - APEX Security Checklist, Scott Spendolini

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