



MHI Vestas – Cloud Native Journey

PRESENTER NAME

Agenda

- Who are we?

- Who is MHI Vestas? Or the long version

- Mitsubishi Heavy Industries Vestas Offshore Wind Power

- Cloud Native?

- Where do we come from
- Where are we going

Who am i ?



Name: Thor Anker Kvisgård Lange
Occupation: IT Architect Cloud infrastructure

MHI VESTAS OFFSHORE WIND™

Who am i ?



Name: Anders Keis Hansen

Occupation: IT Architect Cloud infrastructure

MHI VESTAS OFFSHORE WIND™

Established in 2014 on decades of experience

Delivering affordable offshore wind power

- A joint venture between two industry leaders:
Vestas Wind Systems A/S (50%) and Mitsubishi
Heavy Industries Ltd (50%)
- Founded 1 April 2014, now employing ~3,600
employees
- Sole focus on offshore wind
- Our business is to design, manufacture, install and
service wind turbines
- Right now MVOW operates only in Europe, but is in
process with opening up in the US and Taiwan

MHI VESTAS OFFSHORE WIND™

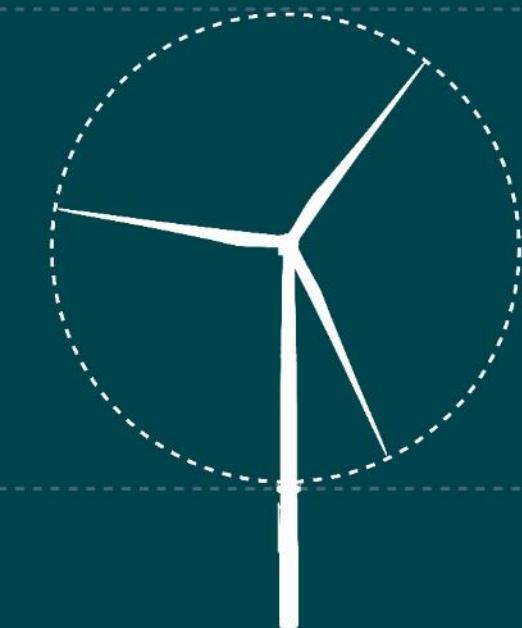
Dimensions of the V164-9.5 MW

The biggest commercially available offshore turbine – larger swept area than the London Eye

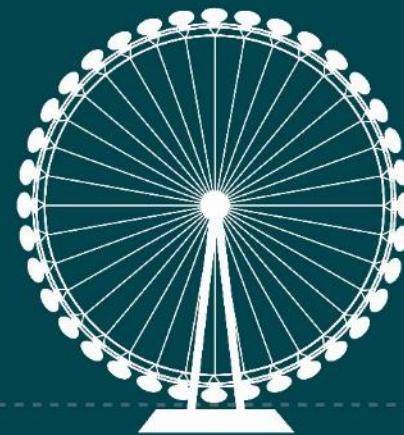
Dimensions

Swept area	21,124 m ²
Power	9.5 MW
Blade length	80 m
Approx. hub height	105 m
Rotor diameter	164 m
Approx. tip height	187 m
Weight (excl. tower)	~ 500 t

V164-9.5 MW
Ø 164m



London Eye
Ø 120m





Cloud native
Where do we come from?

MHI VESTAS OFFSHORE WIND™



We focus on
the core.
MVOW First

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Cloud Native

Where do we come from

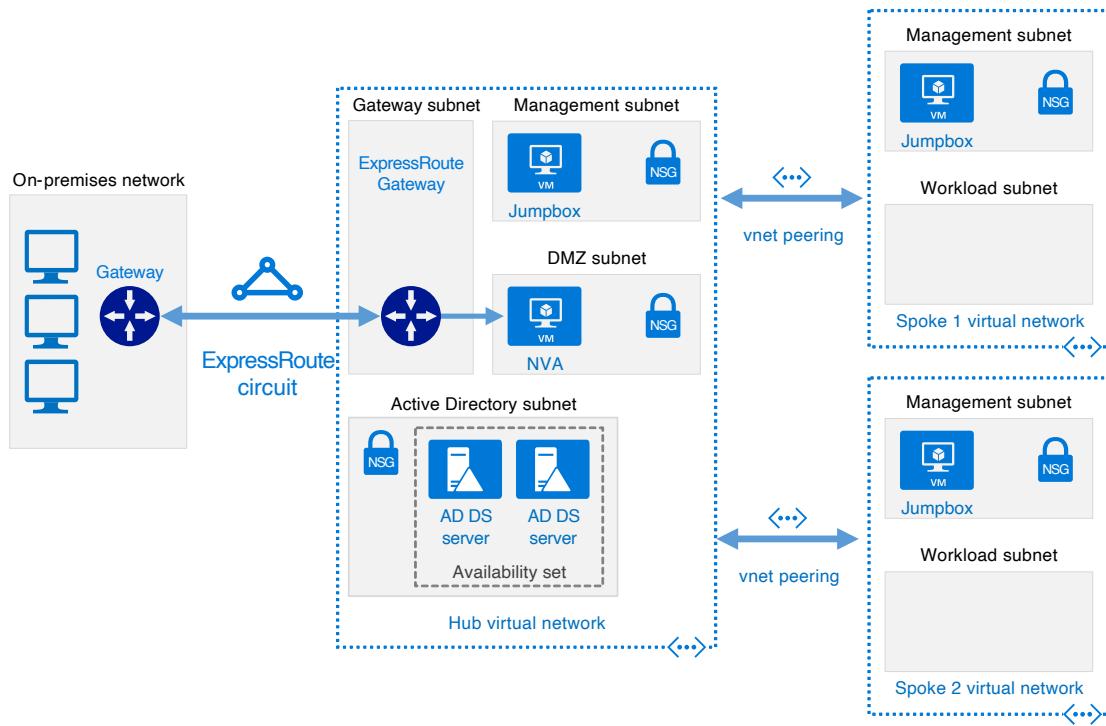
- **MVOW Cloud infrastructure**

- 250% Microsoft house
- Microsoft Azure, since 2014
- Migrated from ASM to ARM in 2017
- 80% off all workloads run in Azure
- Started as a big co-op with Microsoft...
- One big bucket...
- Critical on prem foot print : ERP ,factory systems, Scada Systems



Cloud Native

Where are we going?



The Future

- Cloud agnostic (Hence Cloud Native)
- Every application is an island
- Minimal use of PaaS with too much binding
- Common sense trumps religion ☺

Tool Box

- Using Azure Platform (Network, security, auth. Etc)
- Using Azure Websites(For now)
- Using Azure SQL
- Using Azure Kubernetes service
 - Fun Fact <https://github.com/Azure/aks-engine>
- Using Prometheus & Grafana
- Using Victoria Metrics



How are we using Cloud Native today?

MVOW SMART Turbine® portfolio

When IT becomes part of the product



SMART Foundation Loads

OPTIMISE FOUNDATION DESIGN UPFRONT

Available for: V164-8.0 MW + V164-9.5 MW

The SMART Foundation Loads software package allows you to perform integrated load design simulations prior to undertaking detailed load assessments. The user-friendly tool contains foundation loads from the full turbine model, creating a more effective approach to carry out Front End Engineering & Design (FEED) studies. Multiple optimisation options and scenarios are available to improve foundation designs upfront to generate accurate assessments.

SMART Dampers

REDUCE FATIGUE LOADS

Available for: V164-8.0 MW + V164-9.5 MW

Active SMART Dampers reduce fatigue and design loads by reducing the side-to-side and fore-aft movements of the tower. The dampers also help to extend the use of monopile foundations to more challenging sites, where tough conditions can cause heavy loads. They can work individually or together with passive dampers to maximise damping effects and therefore, cost savings.

Use the SMART Foundation Loads tool to evaluate the potential of SMART Dampers for your next project.

SMART Fast Data

INCREASE THE FREQUENCY OF DATA

Available for: V164-8.0 MW + V164-9.5 MW

When it comes to data, more is best. SMART Fast Data collects information with a frequency that is up to 600 times higher than traditional SCADA methods, from the nearly 1000 sensors in your turbine. Visibility to data at this level provides the option for additional analytics that could otherwise be lost. The SMART Fast Data network infrastructure enables the high frequency data to be optimally stored and analysed, without affecting performance or communication with other data and control systems.

SMART Performance Monitor

PERFORMANCE AT YOUR FINGERTIPS

Available for: All turbines

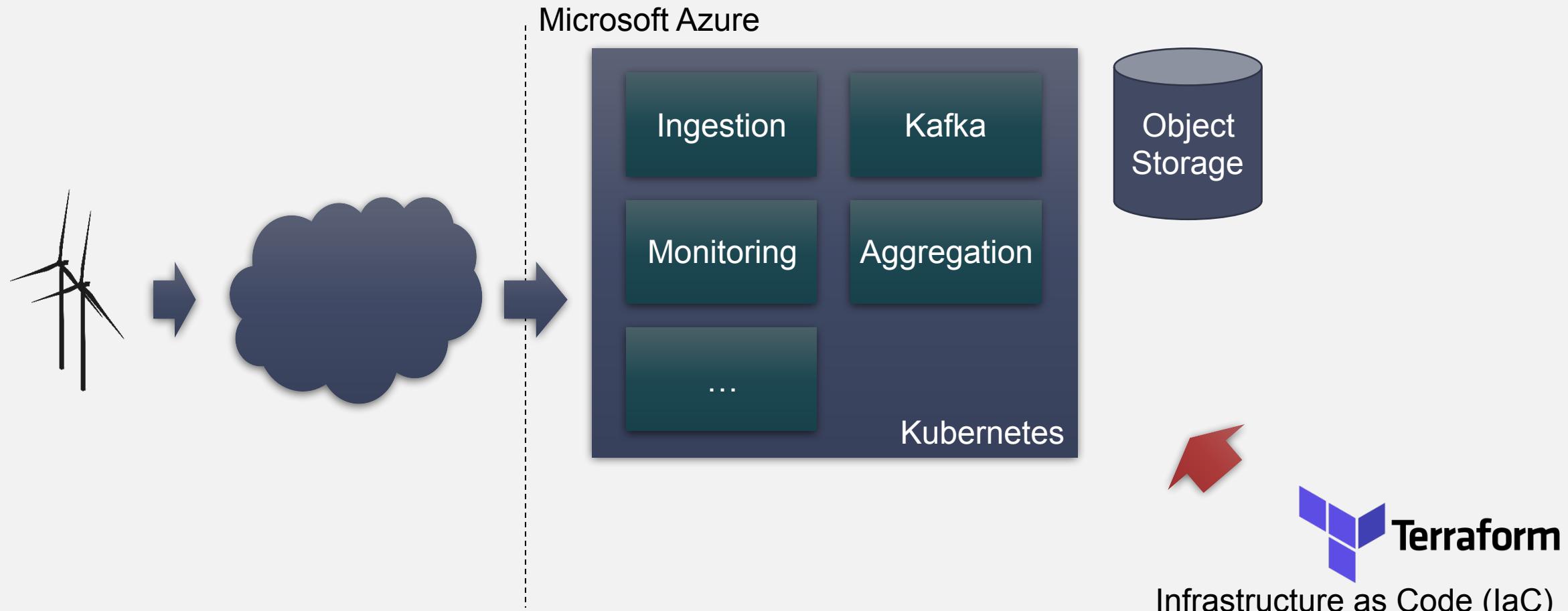
The SMART Performance Monitor tool enables you to monitor your assets right from your desktop, tablet or mobile device. Whether it's a small fleet or a large-scale wind power plant, real-time information on turbine, site production and performance allow you to sit back and let your turbines do the work. Should they require assistance, the SMART Performance Monitor provides detailed operational notifications and insights into key signals such as wind speed and direction, component temperature and pitch angle.



Let's bring in
THOR! ☺

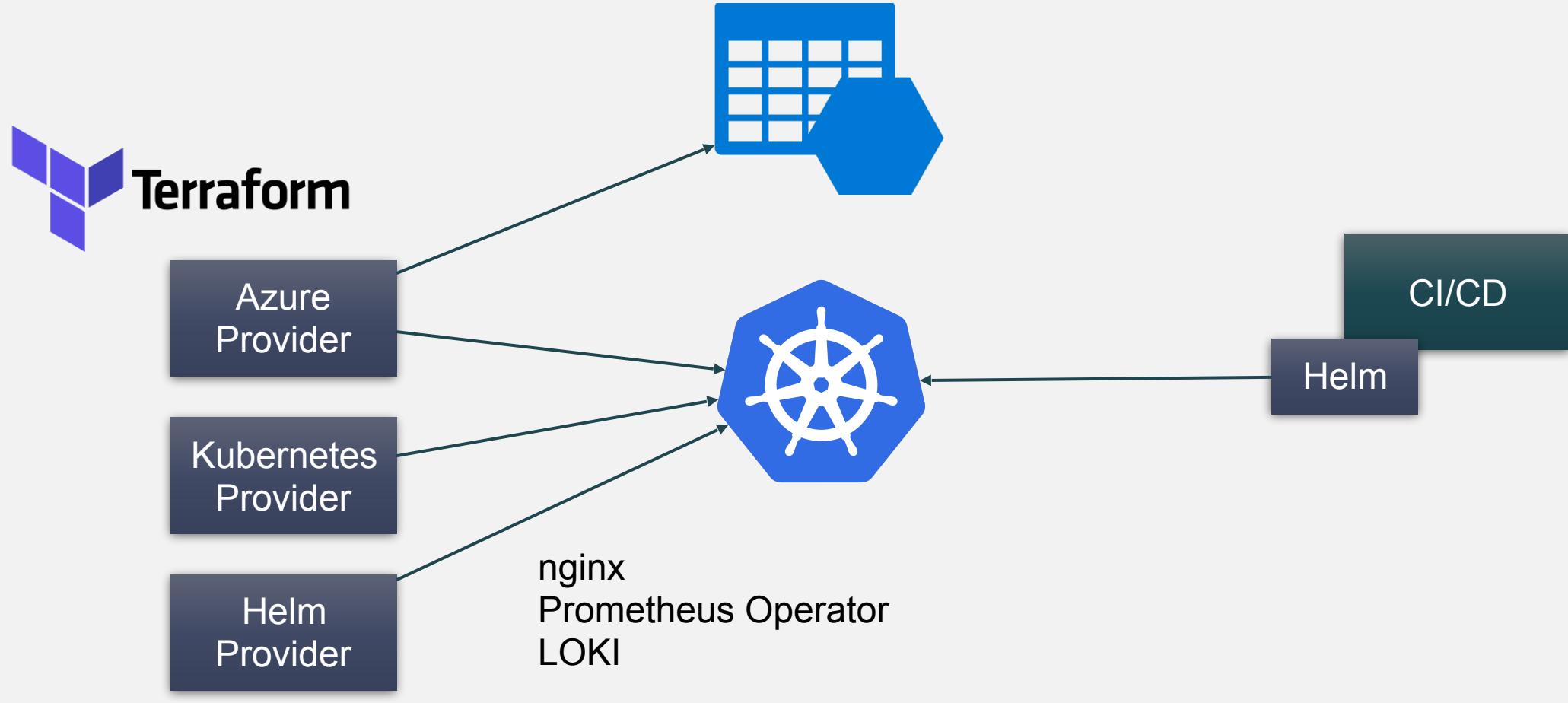
High Level Architecture – SMART Fast Data

...first in-house development from the ground up - CloudNative



Automation - Provisioning

...automate what you can



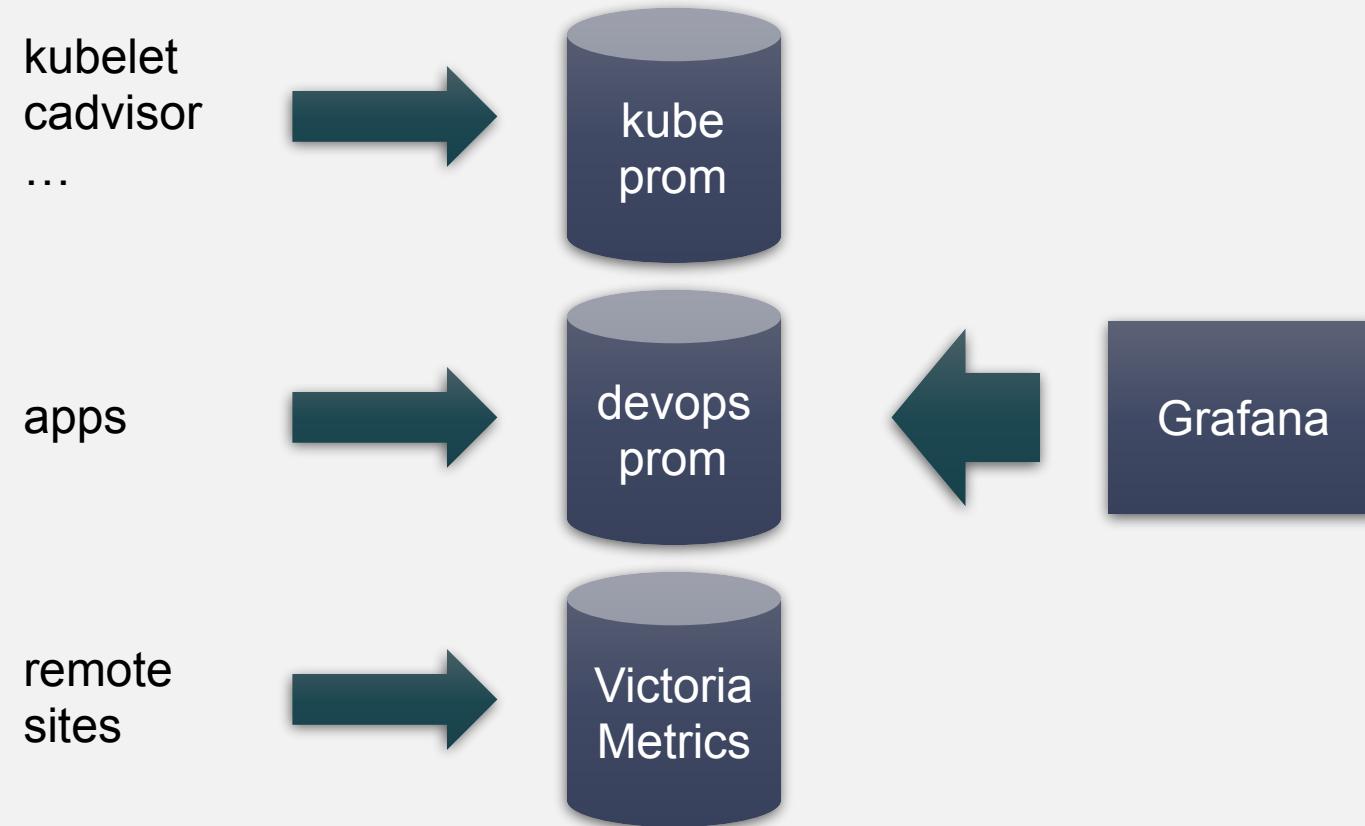
Observability

...with perspective of todays topic

- Metrics is key in objective monitoring
- All components expose metrics in Prometheus format
- Vendor components exposing metrics in Prometheus format
- Kubernetes installed with Prometheus Operator for easy configuration
- Metrics from remote sites streamed in
- Alertmanager used for alerting based on metrics
- Grafana used for dashboarding, exploration and visibility
- Logs collected and exposed by LOKI
- ...distributed tracing is up next

Observability

...Grafana on multiple datasources



Let's take a look



Thanks