# SAS Batch-Verarbeitung in der Welt von Kubernetes & Co.

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# Agenda

- SAS Viya Workload Management (on Kubernetes)
- Infrastructure considerations
  - Choosing the best instance type (CPU, memory, local storage)
  - Benefits of enabling autoscaling for Compute nodepool
- SAS Viya Batch CLI
  - Live demo

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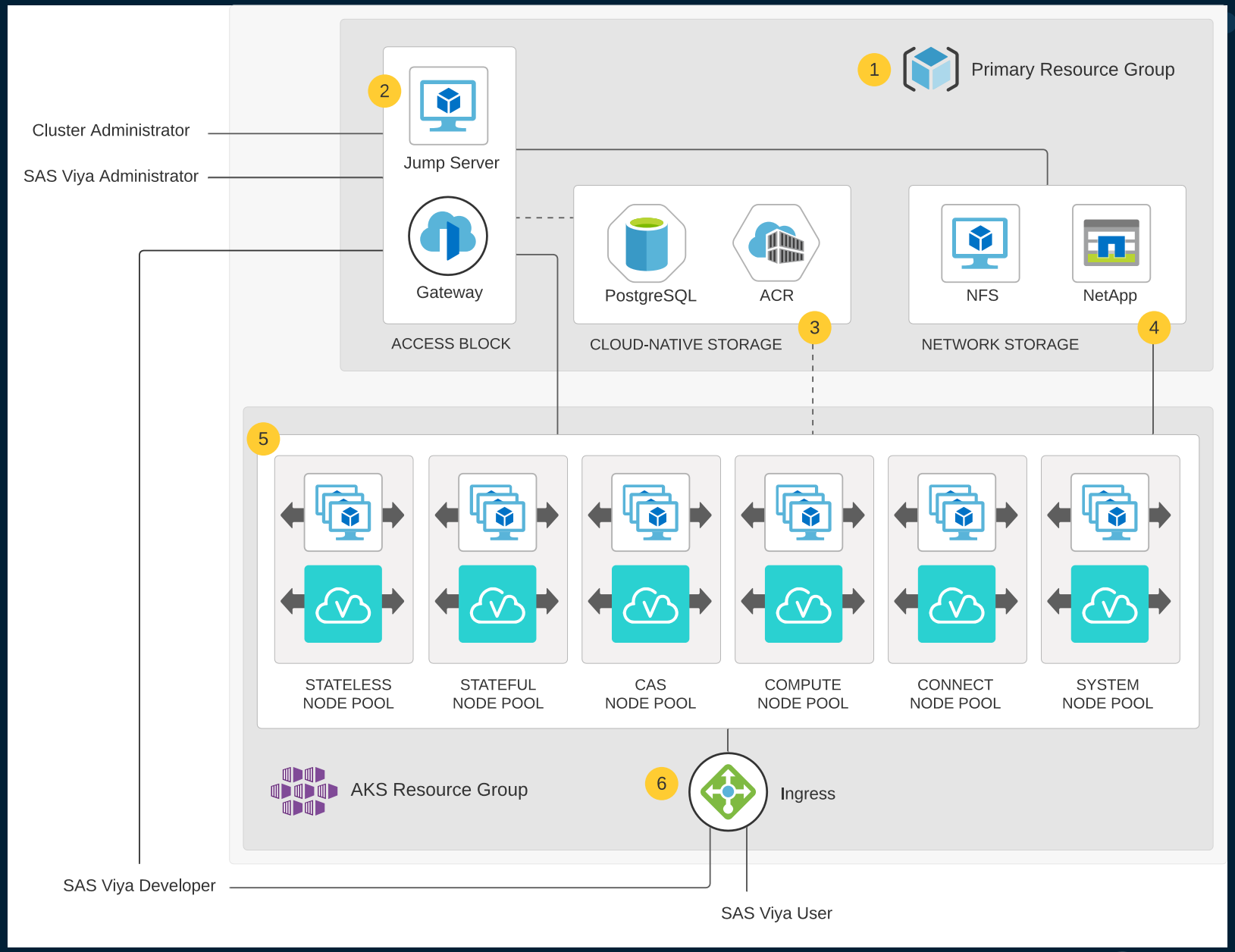
# SAS Viya 202x.x

## Deployment overview for Azure (taken from Viya Operations Guide)

- Focus on the COMPUTE nodepool today
- Kubernetes scheduler assigns all SAS jobs to run on COMPUTE (if available)
- User/warehouse data lives on (shared) network storage or in databases
- Nodes have local storage attached as well (SASWORK?)

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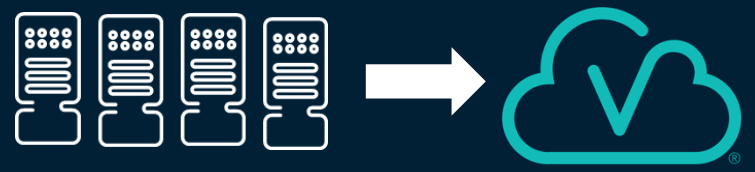
# SAS Workload Management

## (bringing SAS Grid to Viya)

- November 2020 – Kubernetes
  - High availability
  - Scalability
  - Batch submission of jobs
  - Job flow definition/scheduling
- 2021 – SAS Grid parity
  - Option sets for users/groups/roles
  - Queues
  - Prioritization
  - Preempt/resume
  - SAS program checkpoint/restart
- 2022+ – Workload Optimization
  - Optimization of cloud resources
  - Profiling



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# Infrastructure considerations

## Kubernetes storage concepts

- Pods have access to ephemeral storage which is directly attached to their host (i.e. worker node)
  - Not a good choice for SASWORK and CAS Disk Cache
  - Better attach additional fast disks to Kubernetes nodes (e.g. select the right instance type in public clouds)
- User / warehouse data needs to be made available on shared storage („RWX storage“) mapped to Kubernetes
  - Cloud providers offer managed services for this, e.g. EFS, Lustre, Azure Files, NetApp etc.
  - NFS is a popular and simple choice for on-premise clusters
  - Keep in mind that SAS processing is still heavily I/O-bound (even with SAS Viya)

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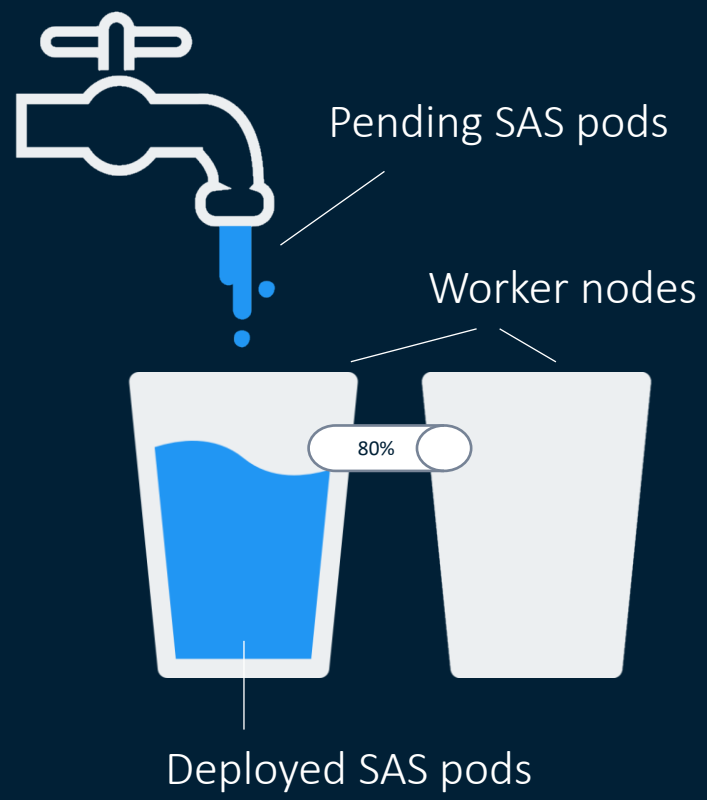
# Infrastructure considerations

## Enabling autoscaling for Compute nodepool

- Allows Kubernetes to grow (and shrink) the number of worker nodes in the Compute nodepool in response to the requested workload (number of SPRE sessions)
- Great for adding compute power „just in time“ without wasting resources (and money)
- The Kubernetes Cluster Autoscaler component instructs the underlying infrastructure (AWS, Azure, GCE, OpenStack etc.) to add or remove machines
- Decisions based on node utilization and declared resource usage of pending pod

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# SAS Viya Batch CLI

## Setup

- Download CLI and configure

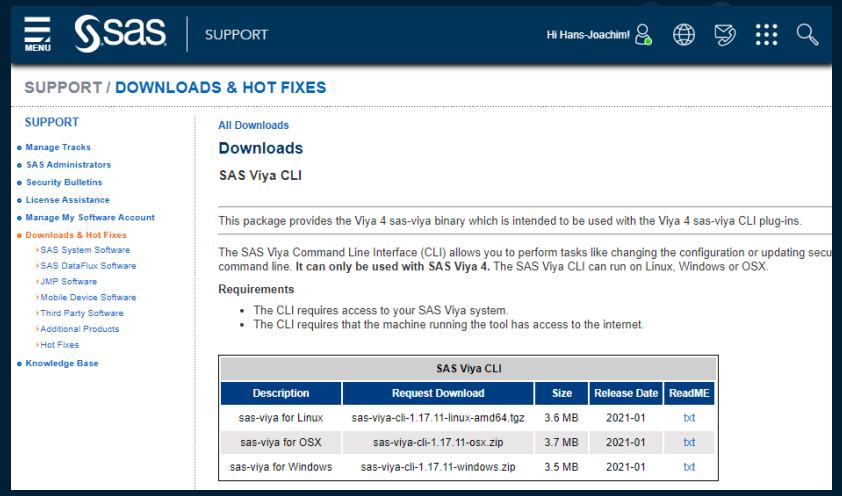
```
export SSL_CERT_FILE=/path/to/server.crt

sas-viya plugins install --repo sas authorization
sas-viya plugins install --repo sas batch
sas-viya plugins install --repo sas compute
…

sas-viya profile init
sas-viya auth login
```

- Run interactively or integrate with your enterprise scheduler

```
sas-viya batch jobs submit-pgm \
  --pgm-path /myuser/sas/mypgm.sas \
  --context default
```

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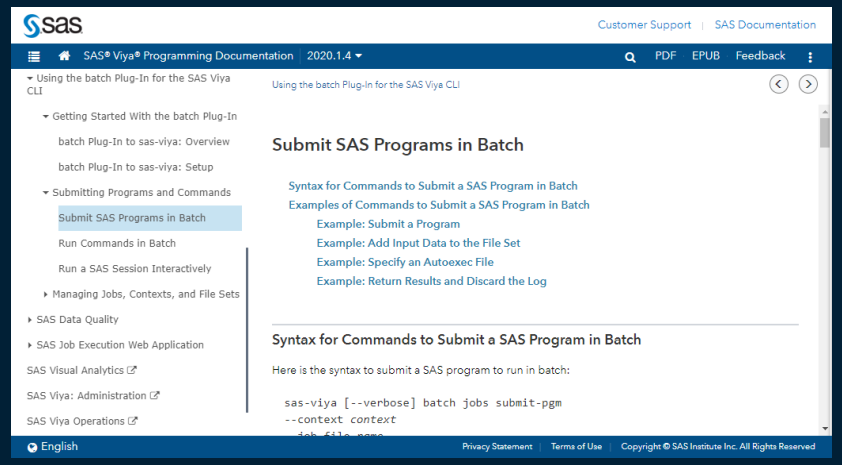


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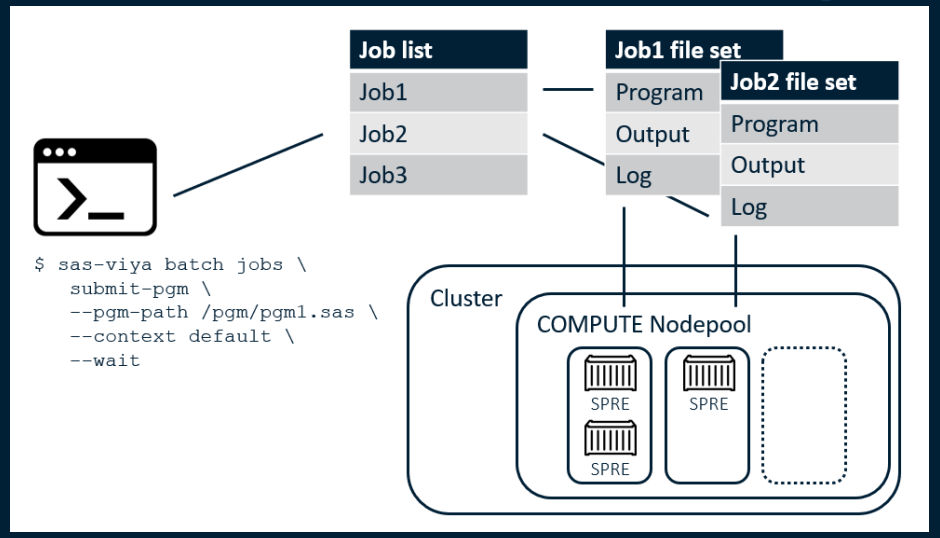
# SAS Viya Batch CLI

## Usage

- The Viya Batch CLI allows you to submit SAS programs and commands to a SPRE environment
  - Every SPRE session is a separate Kubernetes pod of type „job“
  - Kubernetes „job“ objects always run to completion (unlike services they stop)




- You can submit SAS programs interactively or in batch
- You can define execution contexts (user identity, SAS options …)
- Results, code, logs, (data) is kept in a SAS managed file set
- Usage of Batch CLI is restricted via permissions (set in EV)

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# Demo Time!

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# Thank you for your time!

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