Survalent.

Offline Environments

Oct 9th, 2025

Introduction

ADMS is a complex environment, and it is one of the core applications of a utility. Offline environments are available to address the different utility needs, including:

- Test and confirm any changes made to the ADMS beforehand
- Ensure users are trained on all the new and advanced applications
- Provide operators with an option to evaluate their possible actions without impacting the production

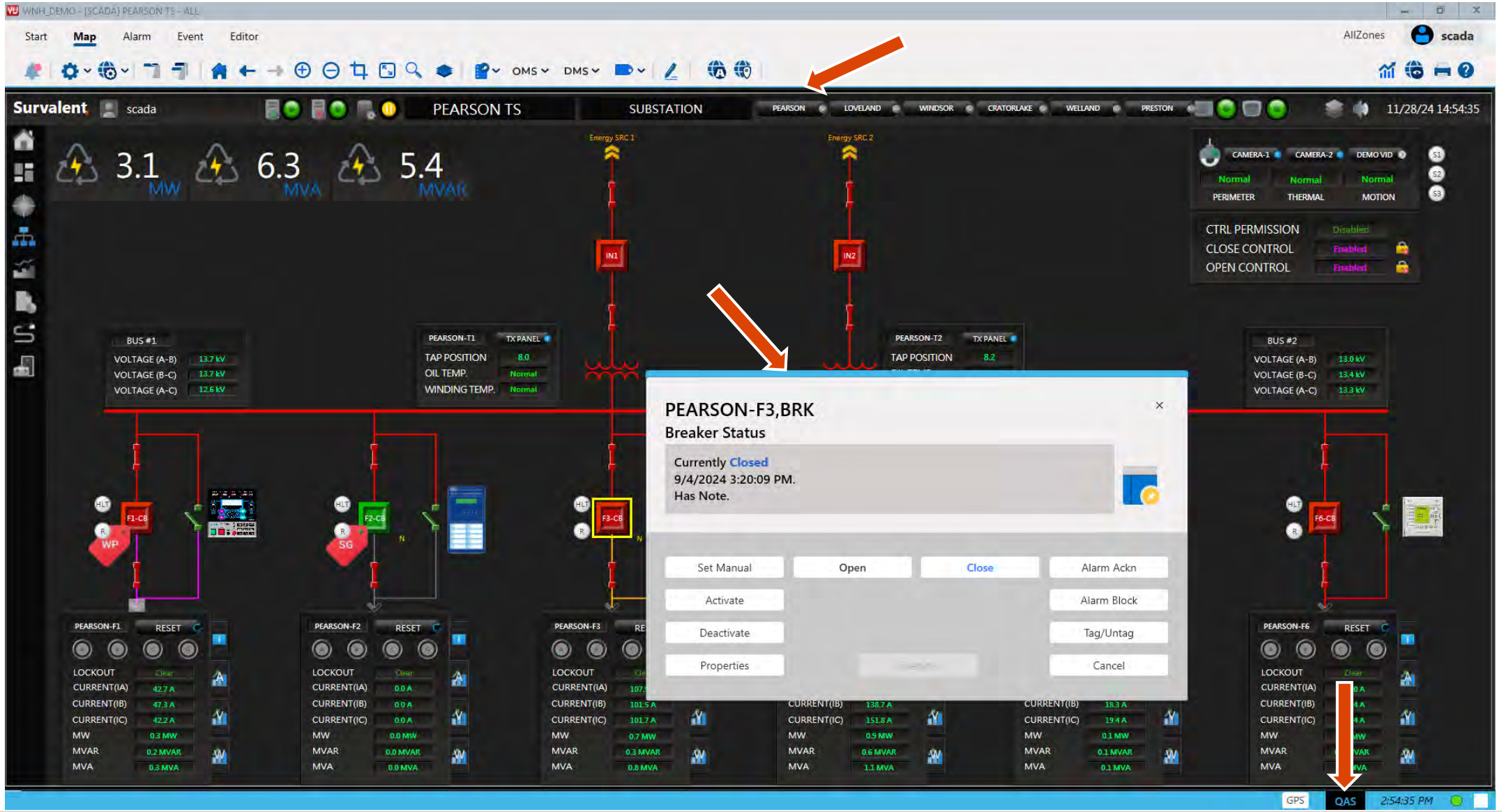
Available Offline Environments

Project Development System (PDS)	Quality Assurance System (QAS)	Operator Training Simulator (OTS)	Operational Analysis Env. (OAE)
Allows users to: ▪ Edit in an offline environment ▪ Publish changes to production once the user is ready	Allows users to: ▪ Test software updates/patches ▪ Test configuration changes ▪ Perform hardware/software tests	Allows users to: ▪ Train on the ADMS in an offline environment ▪ Test or validate scenarios (in testing phase)	Allows users to: ▪ investigate future hypothetical states of the network ▪ Offline power system simulator available to see how the network would react

▪ Project-based – multiple concurrent projects can be active at any time
▪ Multiple users can edit concurrently as well
▪ Option to test changes in the offline environment before publishing to production
	▪ Replicate your production environment in a test setting	▪ Take a snapshot of the production system
		▪ Save multiple snapshots of DB into separate studies
		▪ Global command sequence manager available for all studies
		▪ Validate switch orders in OTS, then import into the production system
			▪ Available pool of VMs, allows multiple users to run separate studies at once
			▪ Can be used to validate Switch Orders
			▪ Two modes available:
			  ▪ Real-time
			  ▪ What-if
			▪ Offline power system simulator available to see how the network would react

** Data forwarding license can be used with any of these four servers to update the servers with real-time data*

Differentiating the Offline Environments



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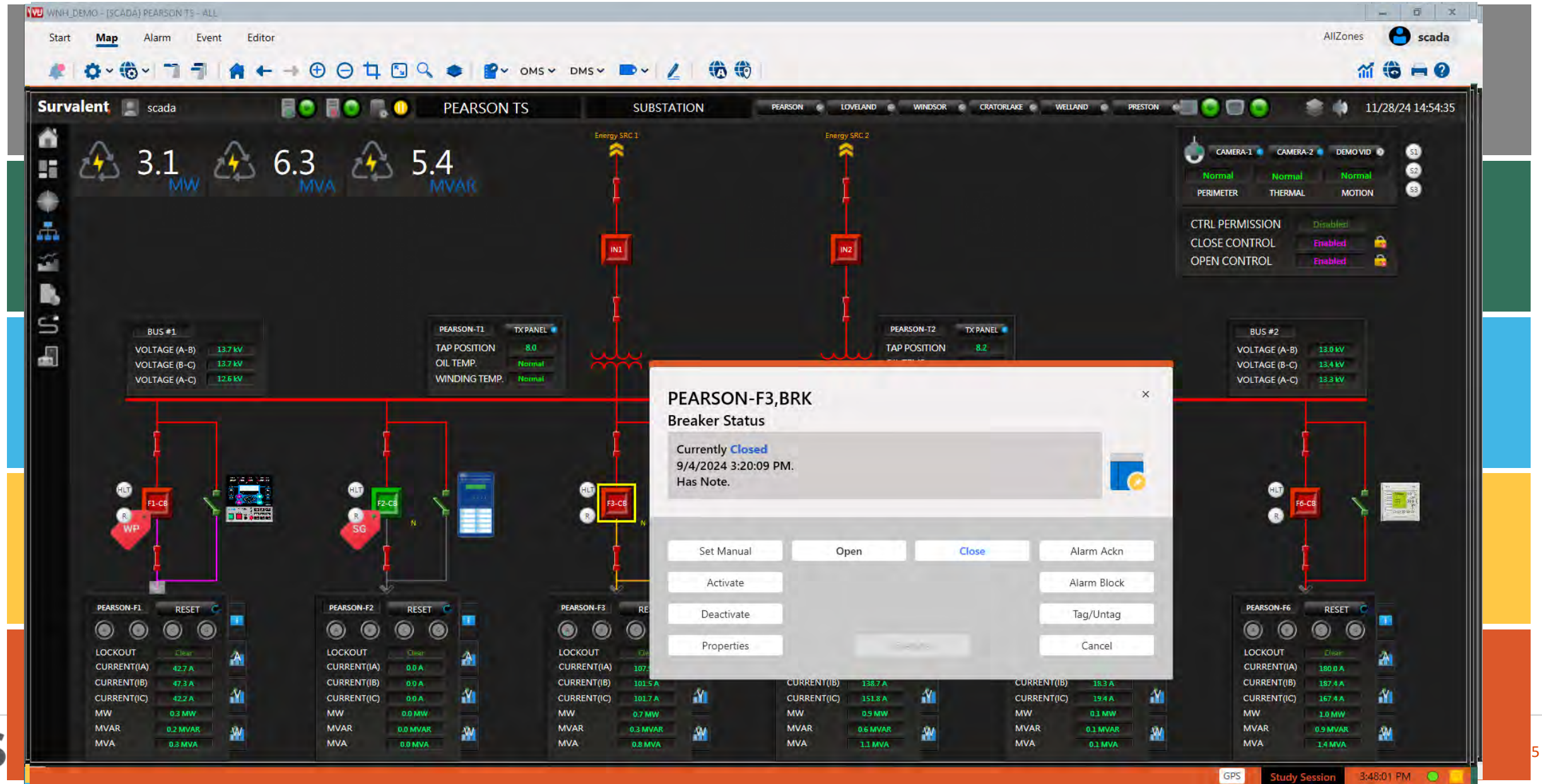

Project Development System (PDS)

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PDS is an offline development and quality assurance environment for utility administrators

SurvalentONE users can design, test, and approve proposed changes to their ADMS environment before publishing them to the production system

Current Way of Editing

- Changes are applied directly to the production (live) system
- Logging of edits must be turned on (database only)
- No automatic backup, no warning messages
- GIS import can affect the state of the network

Drivers for PDS

Users looking for an application that:

- Reduces RISK for new projects in existing systems – mistakes are caught in the offline environment
- Enables users to perform routine tasks (e.g. adding/replacing IEDs) without impacting the production system (which can impact the end-users in their day-to-day operations)
- Provides better auditing capabilities
- Helps with staff turnover – new users are not making their changes directly on the production system
- Improves the process of updating the system
  - Facilitates having multiple users editing at once

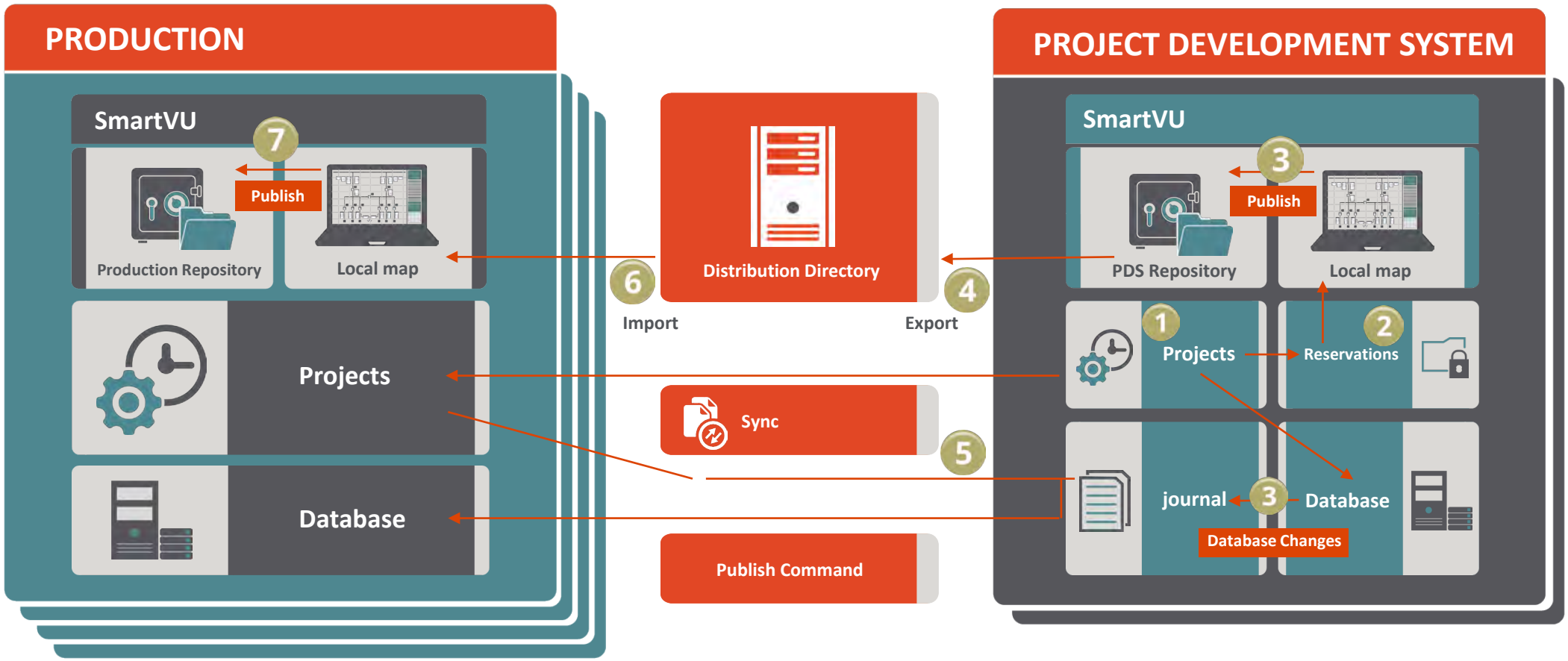
PDS Benefits

1. **Sandbox** – Mirror production environment and data forwarding
2. **Isolation** – Adding new communication lines and testing directly from PDS
3. **Share the work** – Concept of projects, submaps and individual resources locking
4. **Validate/Approve** – Controlling when the changes are ready for publishing
5. **Integrate changes** – Journal takes care of transferring all the DB changes to the live system

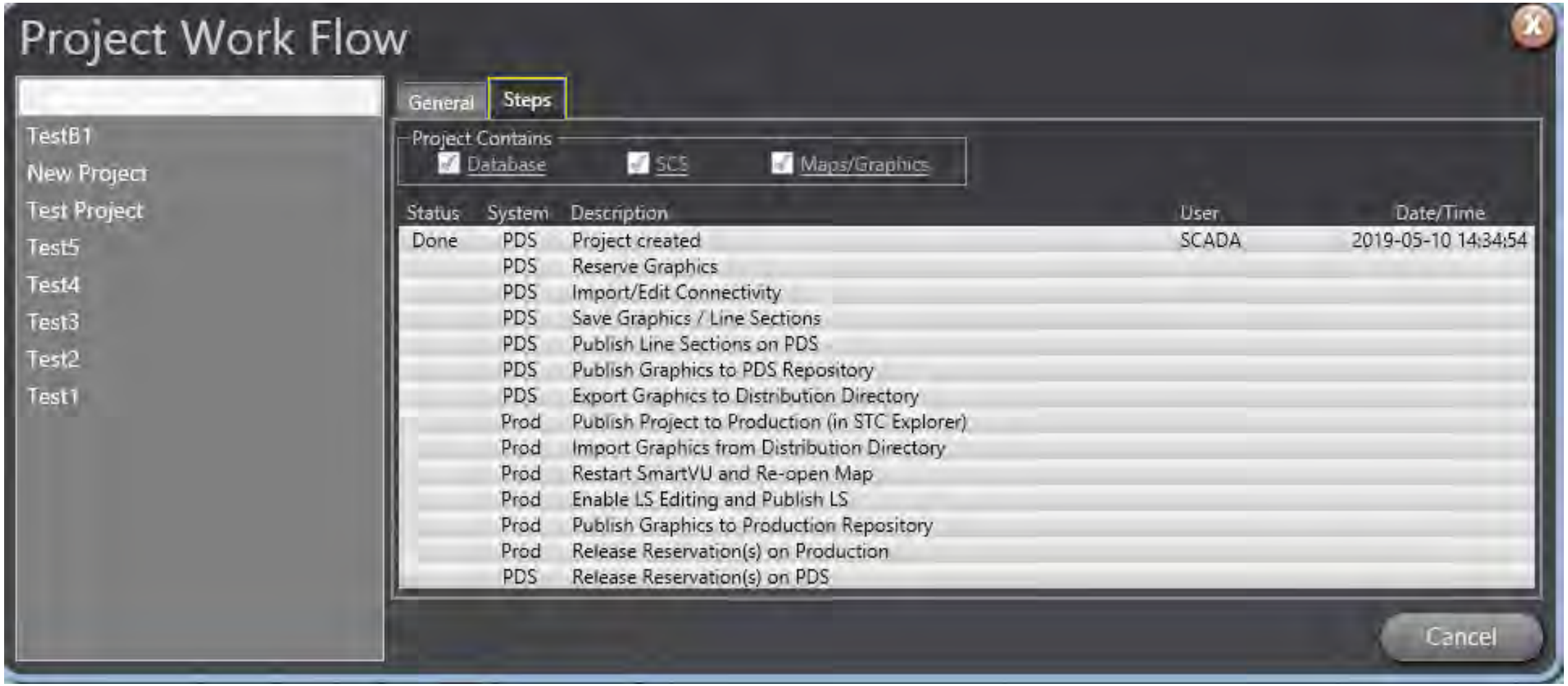
PDS Requirements

1. Separate license required for PDS
2. Requires a standalone server(s), physical or virtual
   A. Requires network access to production, to synchronize and publish changes
   B. PDS supports dual-redundancy
3. Administrator/Operator Training
4. Data Forwarding Configuration (optional)

PDS Workflow



PDS Project Workflow



Quality Assurance System (QAS)

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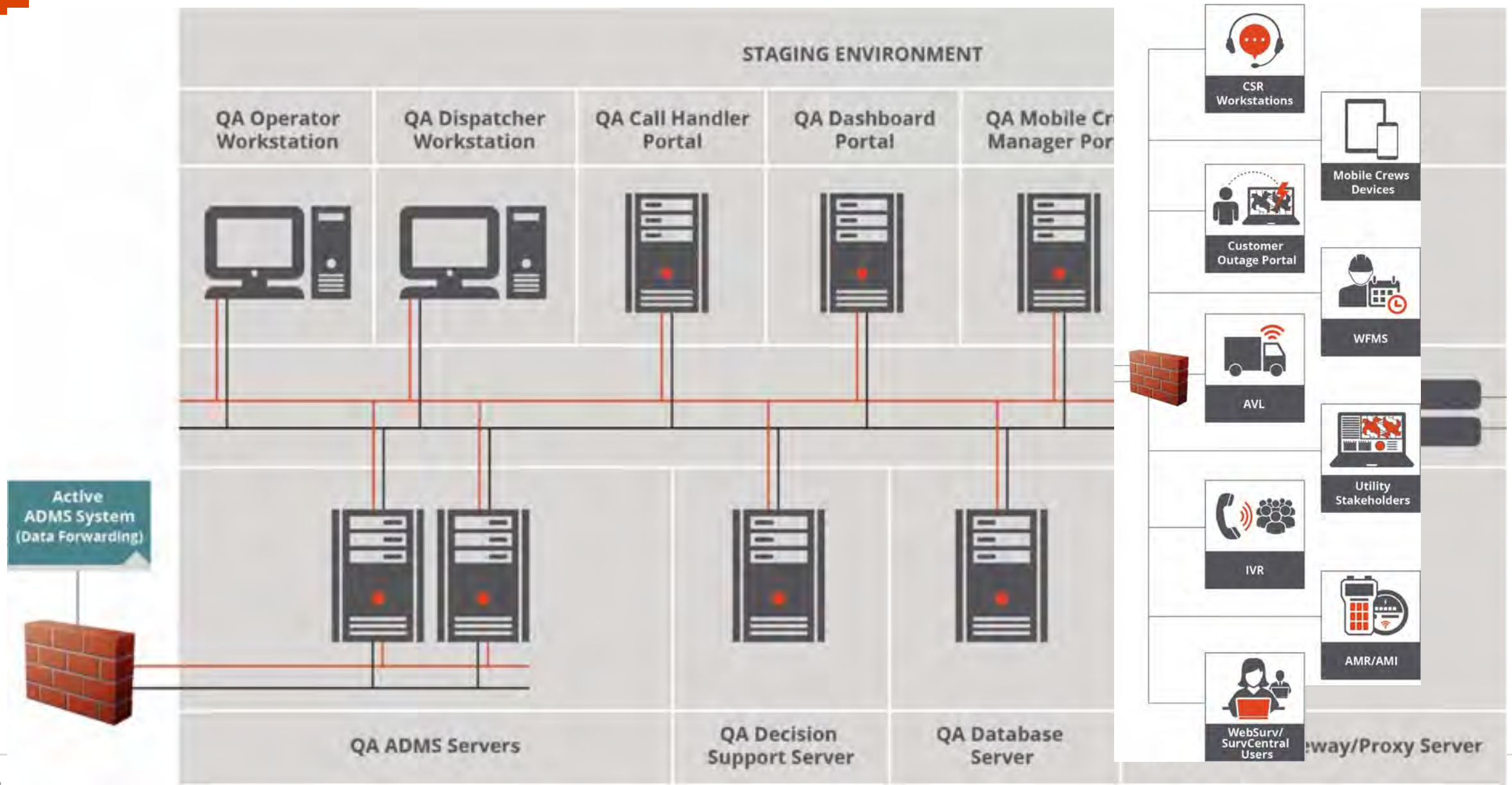
QAS is an offline system for utility administrators to test software/hardware changes

SurvalentONE users can apply any new Survalent kit, Windows update, and third-party software update to the QAS first to validate it before making the changes to their production environment

QAS Environment



Operator Training Simulator (OTS)

Operator Training Simulator (OTS)

OTS is an offline system for operators and dispatchers to train on the ADMS

SurvalentONE users can familiarize themselves with new applications by training in the OTS. Trainers can setup scenarios for the trainees to walkthrough

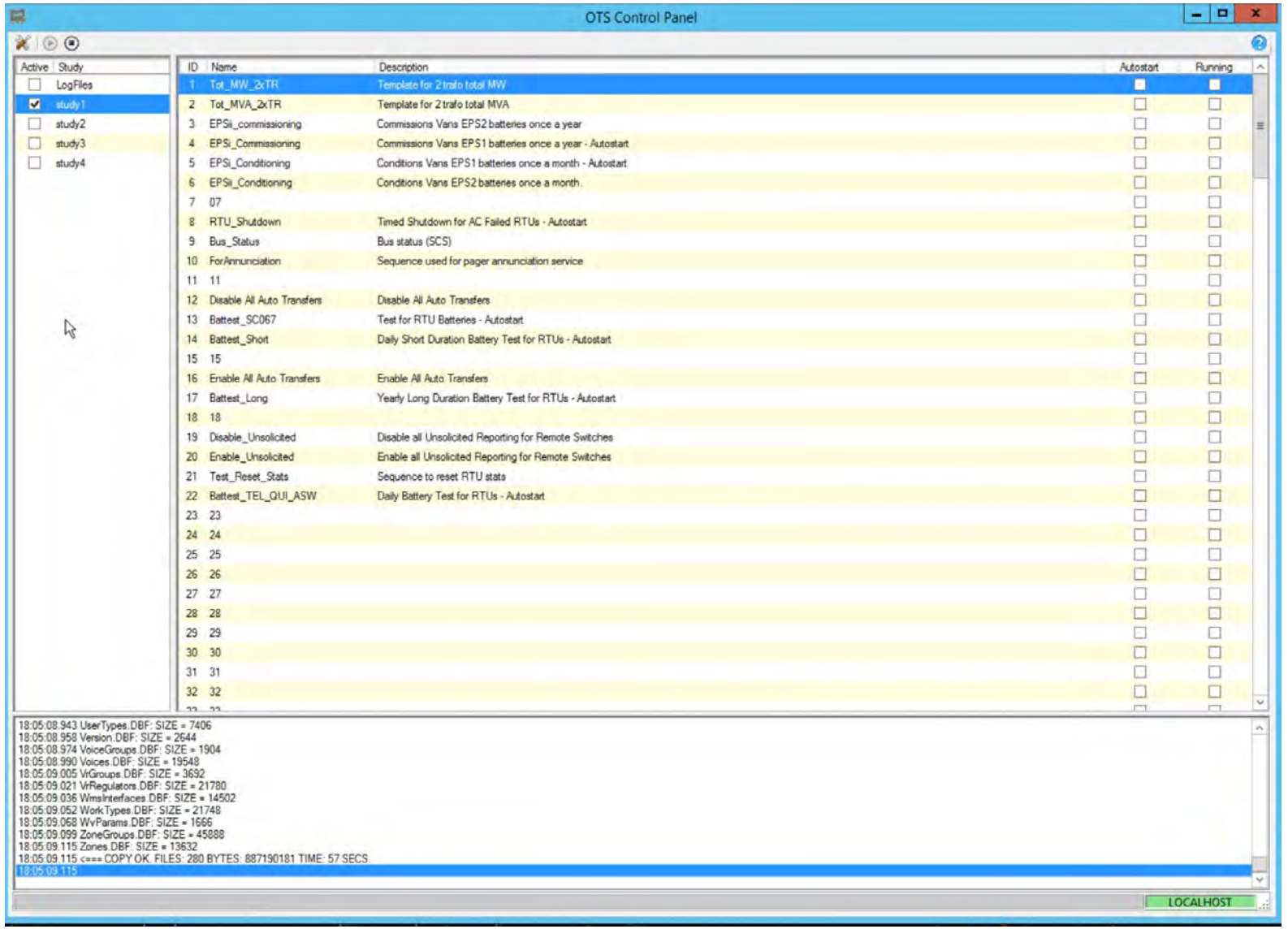
Operator Training Simulator

- Operators and dispatchers need a sandbox environment to learn about new features and applications
  - Train in the offline environment before a feature goes live in production
- Trainers can create scenarios for the trainees to learn on
  - Command sequences and scripts are available to simulate events
- Multiple scenarios (called ‘studies’) can be saved and loaded as a starting point

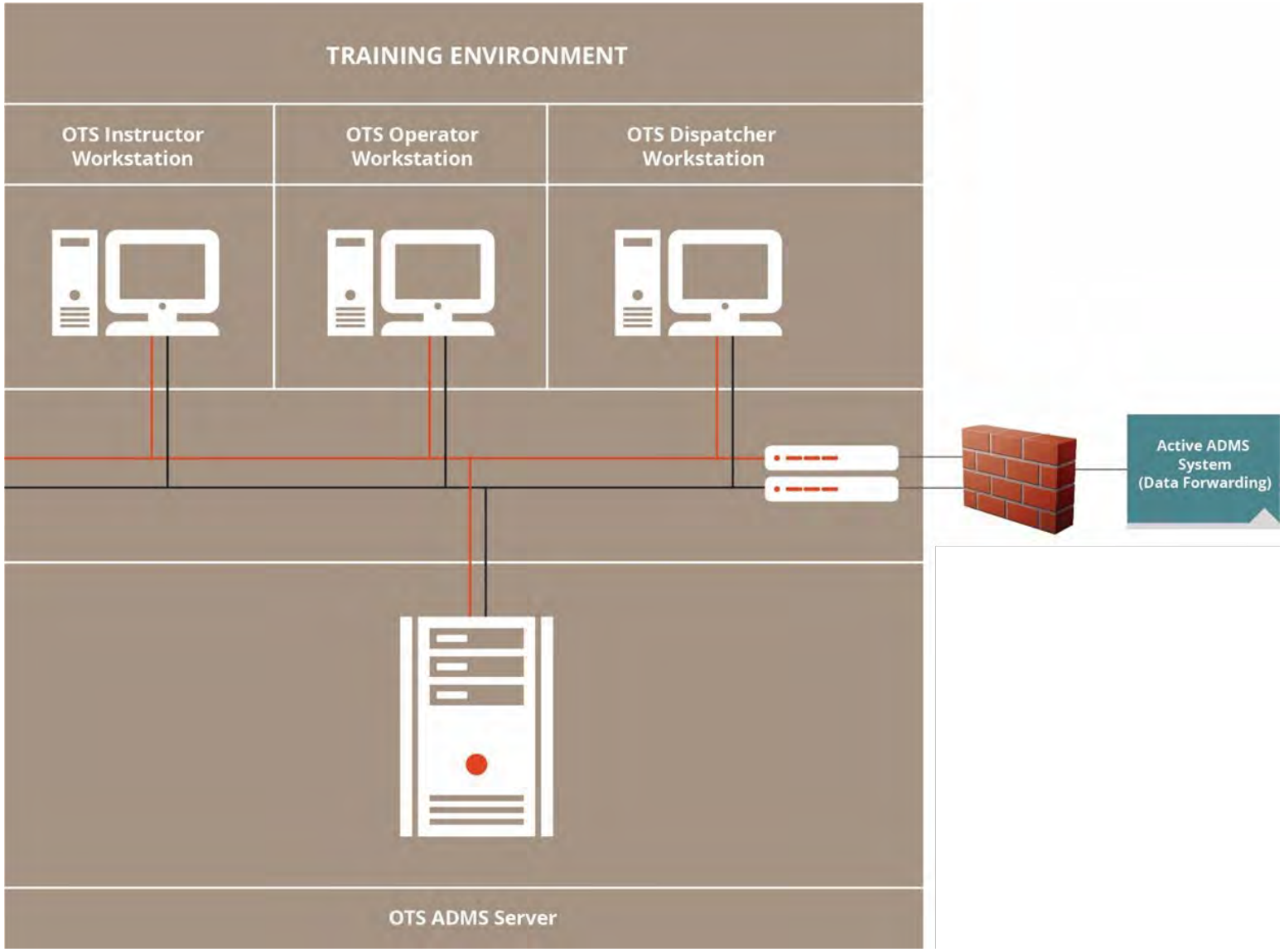
Operator Training Simulator

- Synchronize with the production database or create snapshots (‘studies’) of the production database
  - Multiple ‘studies’ can be saved and loaded at any time
- Command sequences can be used to simulate scenarios
  - Global command sequence editor available where the command sequences can be used in any study
- OMS scripting tools available as well
  - Simulate calls, AMI events and device operations
- SCANX protocol available to simulate communication lines

OTS Control Panel



OTS Architecture



Operational Analysis Environment (OAE)

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OAE is an offline environment for users to investigate hypothetical future states of the power system

The Operational Analysis Environment allows users to investigate how their operations can affect the production system without impacting the production system. Studies can be performed on data synchronized from the production system or from saved snapshots

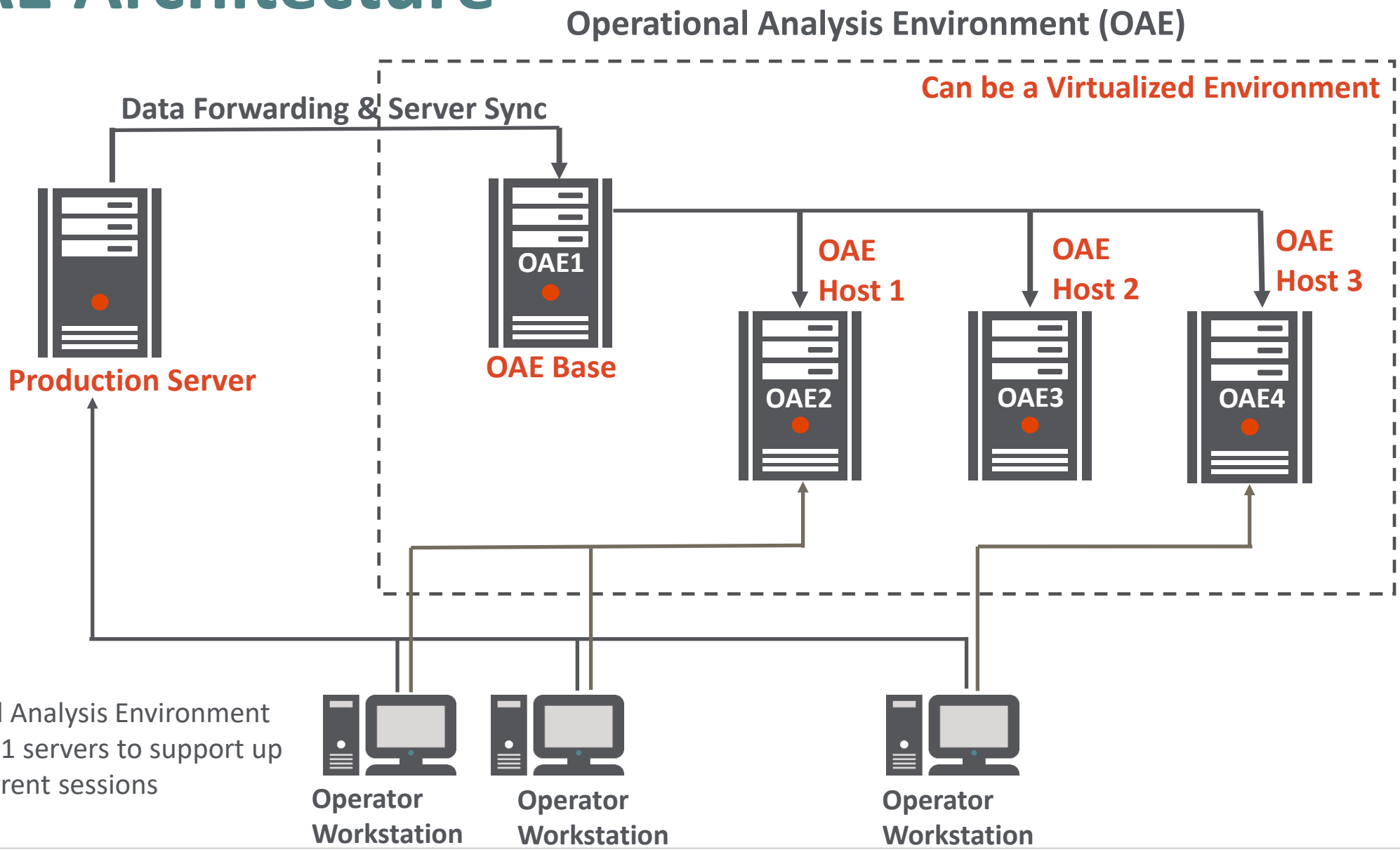
Operational Analysis Environment (OAE)

- The OAE allows operators/engineers to perform their analysis (what if/playback) in an offline environment without impacting the production environment
- From their production environment SmartVU, users can initiate a Study Session and/or Playback Session based on their licensing
  - A separate instance of SmartVU, connected to the OAE, will launch
- Users can use the knowledge gained in the OAE to more confidently perform their actions in the production environment or to better prepare for future events

OAE Components

- **Production Servers:** Keeps the Study Base synchronized with the latest real-time values (and database)
- **Production Workstation:** Users would call up a study or playback session from their production SmartVU
- **OAE Base:** Keeps all the OAE Hosts synchronized when not in use so that users could quickly initiate a study session with real-time values
- **OAE Hosts:** A study host would be reserved when a user wants to start a study or playback session. To be able to run *N* unique concurrent sessions, there would need to be *N* OAE Hosts available

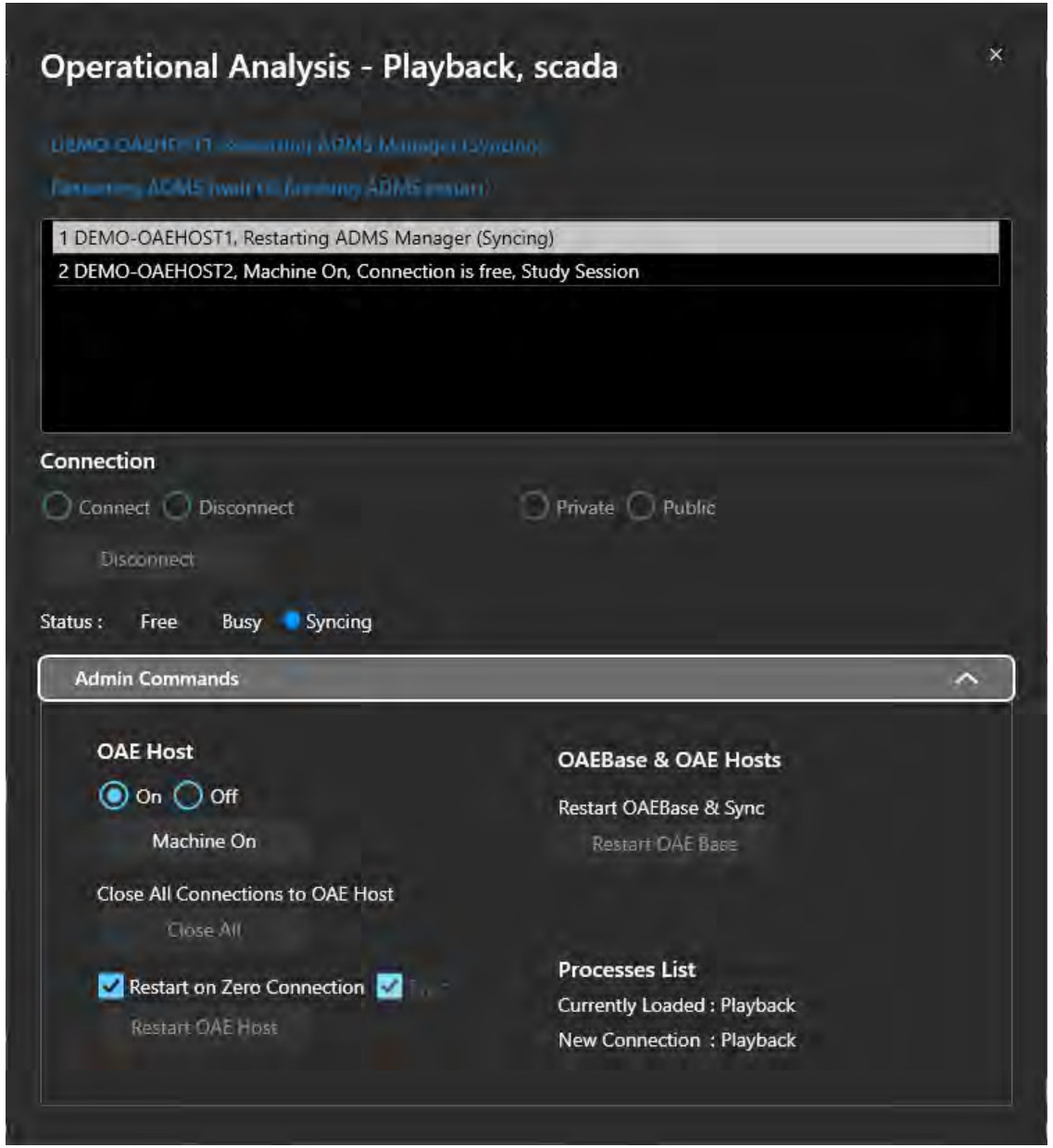
OAE Architecture



Operational Analysis Environment requires N+1 servers to support up to N concurrent sessions

OAE Use Cases

- **Study Mode**
  - Prepare switch orders
  - Review actions before executing them in the production system
- **Playback**
  - Review a major event that occurred in the system



OAE Key Features

- Option to have multiple users using Study Mode or Playback concurrently
- Create, edit and validate switch orders in Study Mode and import the modified switch orders to the production system
- Initiate a study session from the real-time production system data, saved studies, or the as-built network
- Power System Simulator module available to simulate the effects of the switching operations on the network
- Playback mode available to replay an event

OAE Playback

- Short-term (14 days) and long-term playback available
  - Long-term playback requires the Advanced Historian
- Specify the start/end range of the playback period
- Control the speed of the playback
- Choose to step through the playback by time or events

Conclusion

- As ADMS becomes more complex and critical for utilities, it becomes crucial to offload certain tasks (editing, testing, training, studies) to an offline server
  - Utilities can choose which servers to prioritize first
- The offline servers allow users to do their tasks with confidence without affecting the production system
- Helps ensure that the production system only has validated changes applied

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Questions?

Thank You