



JobScheduler Operations Center: JOC Cockpit

Overview

Information for
Interested Parties

Table of Contents

JOC Cockpit Motivation

- Motivation for the JOC Cockpit
 - Pain Points with the classic JOC and JID
 - Completely new User Experience
- JOC Cockpit Architecture
- JOC Cockpit Security Features
- JOC Cockpit Visualization Features
- JOC Cockpit Interaction Features

Motivation: Pain Points with the classic JOC and JID

Motivation for the JOC Cockpit

1. Architecture

- JOC ships on top of a Master and is restricted to control that Master
- Separate components JOC and JID have to be used
- Information is scattered across different components without interaction

2. Security

- Limited capabilities for authentication
- Missing authorization, missing roles

3. Navigation

- Navigation issue: users are forced to switch tabs
- Usability issue: no consistent information available

4. Visualization

- Presentation issue: textual representation, no graphical representation
- Consistency issue: no system status overview available
- Design issue: no modern design of graphical controls and use of color

5. Interaction

- Missing responsiveness, no mobile devices, page refresh required
- Options deeply buried in context menus

Motivation: Competely new User Experience

Motivation for the JOC Cockpit

1. Architecture

- Platform agnostic component to control a number of Master instances
- Introduction of a RESTful Web Service for access to JobScheduler

2. Security

- Role based authentication and authorization including LDAP support

3. Navigation

- Modern design for better user interaction
- Clear context menus when performing actions

4. Visualization

- Textual and graphical representation (Flow Charts, Gantt Charts)
- Dashboard available for system status overview

5. Interaction

- Near real-time information about jobs, job chains and orders is automatically displayed and refreshed
- Support for desktops, notebooks and mobile devices
- Bulk operations such as stopping all job chains, skipping all nodes or removing all orders associated to a job chain

Table of Contents

JOC Cockpit Architecture

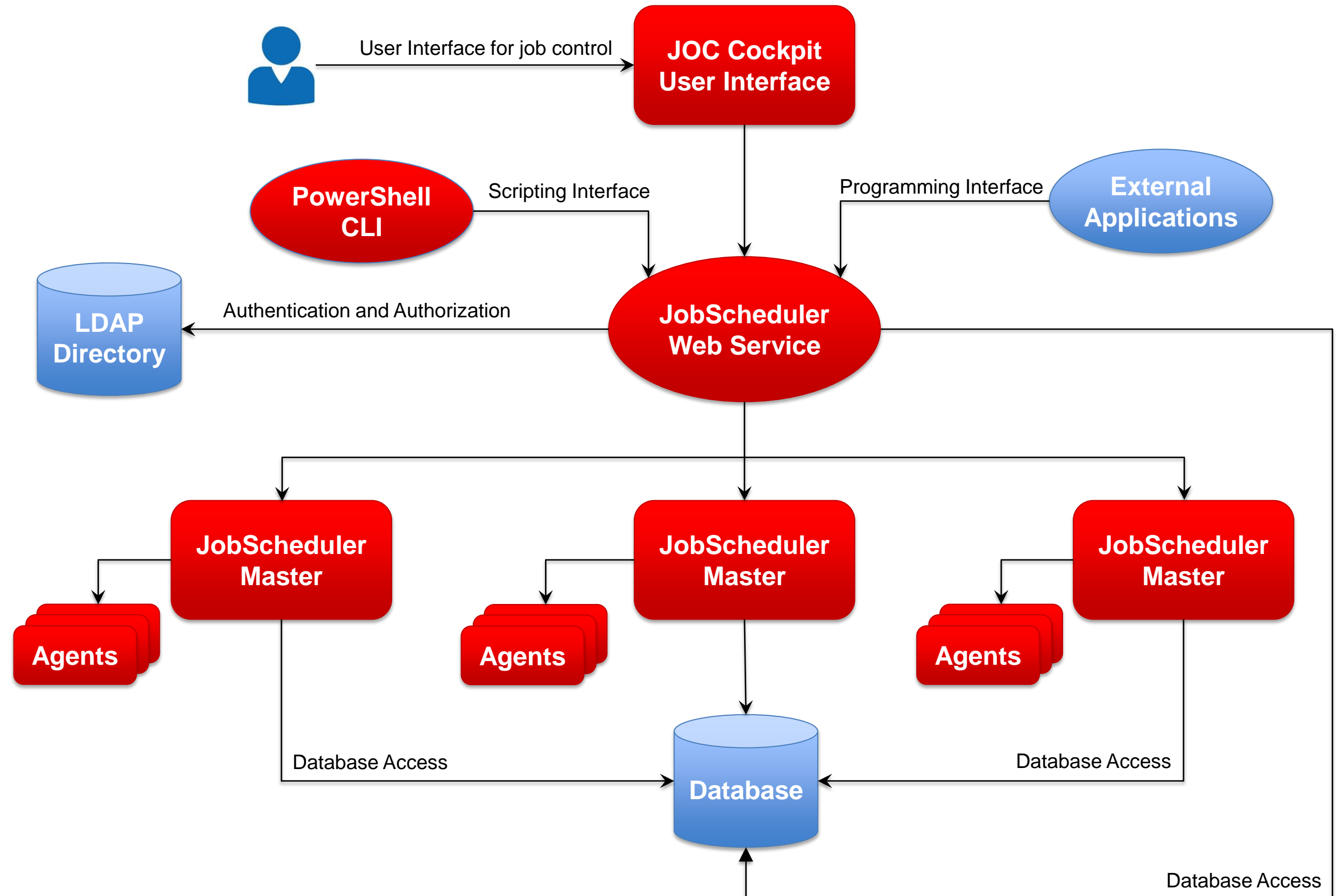
- Motivation for the JOC Cockpit
- JOC Cockpit Architecture
 - Component Architecture
 - Technical Architecture
- JOC Cockpit Security Features
- JOC Cockpit Visualization Features
- JOC Cockpit Interaction Features

Component Architecture

JOC Cockpit Architecture

Component Architecture

- The JOC Cockpit is a user interface for job control with browsers
- JobScheduler Web Service implements a RESTful interface for use by the JOC Cockpit, PowerShell CLI and by external applications
- Users access the Master using the Web Service that performs authentication and authorization – optionally against an LDAP directory
- Users call up information and manage JobScheduler activities, e.g. current executions, planned executions, history etc.
- With the JOC Cockpit it is possible to operate several Master Instances and any number of JobScheduler Agents that execute jobs and tasks for the Masters

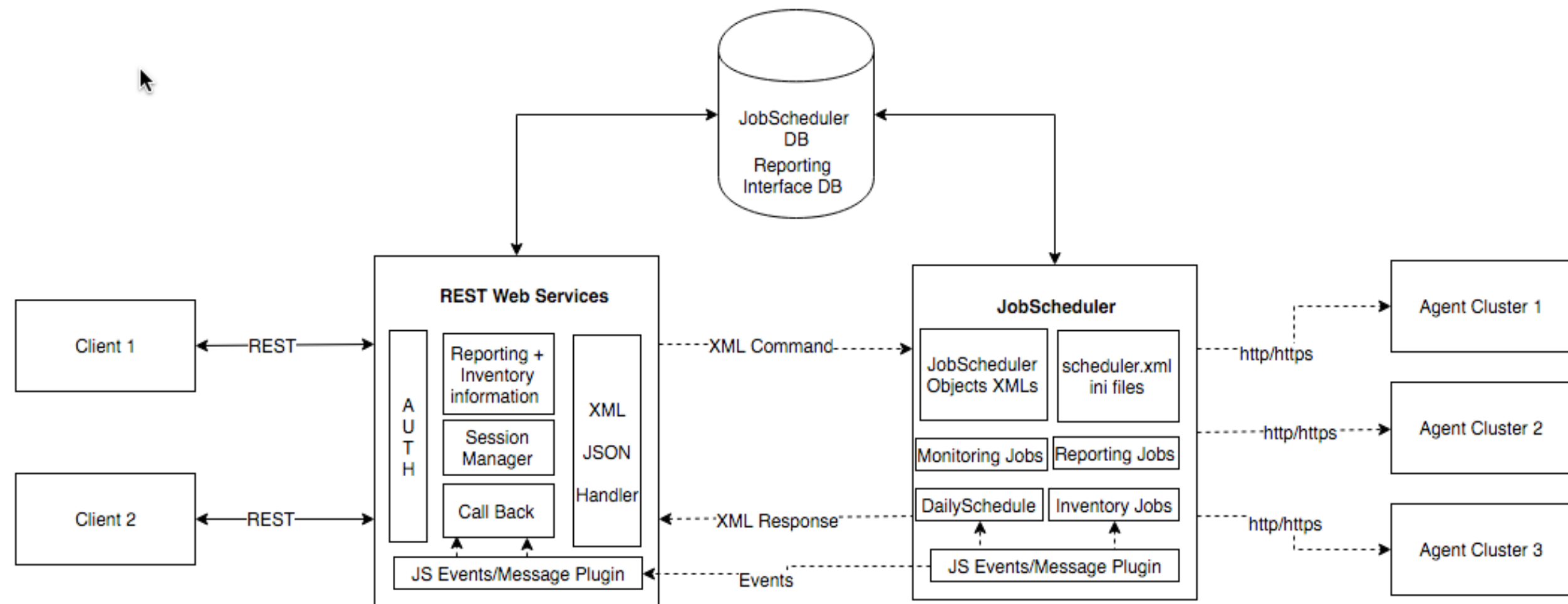


Technical Architecture

JOC Cockpit Architecture

Technical Architecture

- HTTP/HTTPS is used for communication between the RESTful Web Services and the JOC Cockpit - or other applications
- The Web Service uses JSON and XML based commands to communicate with the Masters
- Events about object status changes are communicated between the Masters and the Web Service
- Authentication and authorization is carried out by an Apache Shiro framework integrated into the Web Service



REST Web Services JobScheduler Interaction

Table of Contents

JOC Cockpit Security Features

- Motivation for the JOC Cockpit
- JOC Cockpit Architecture
- JOC Cockpit Security Features
 - Role based Authentication and Authorization
 - Default Roles
 - Matrix of Default Roles and Permissions
 - Single Sign-On
- JOC Cockpit Visualization Features
- JOC Cockpit Interaction Features

Role based Authentication and Authorization

JOC Cockpit Security Features

- What is predefined:
 - Number and type of JobScheduler operations and object permissions
 - Operations include to view jobs, start and stop jobs etc.
- What is configurable:
 - Number and type of roles
 - Permission values (yes/no) are configured for each operation and role
 - Users can be assigned to any of the roles offered
- Identity Provider
 - LDAP for e.g. Microsoft Active Directory, Open LDAP etc.
 - Local shiro.ini file containing user name and passwords
- Mapping of Permissions to Roles
 - The mapping can be configured with a local shiro.ini file
 - The mapping can be configured with an LDAP directory service that identifies group membership of users with specific user groups that are mapped to JOC Cockpit roles

Default Roles

JOC Cockpit Security Features

- Administrator
 - Technical role without any responsibilities in the IT process
- Application Manager
 - Engineering role with in-depth knowledge of jobs and job chains, however, not necessarily involved in daily operations
- IT Operator
 - Role for daily operations of jobs and job chains
- Incident Manager
 - Role for the IT Service Desk, e.g. 1st and/or 2nd level support, for interventions and Incident Management
- Business User
 - Role for backoffice users not responsible for IT (probably for Business Processes)
- API User
 - Role is intended for applications that access JobScheduler via its API

Matrix of Default Roles and Permissions

JOC Cockpit Security Features

No.	Permissions		Roles					
	JobScheduler Object	Operation	Administrator	Application Manager	IT Operator	Incident Manager	Business User	API User
1	JobScheduler Master	can view status / information	YES	YES	YES	YES	YES	NO
		can pause / continue	YES	YES	NO	NO	NO	NO
		can restart	YES	NO	NO	NO	NO	NO
		can terminate / restart	YES	NO	NO	NO	NO	NO
		can abort / restart	YES	NO	NO	NO	NO	NO
		manage log categories	NO	YES	NO	YES	NO	NO
		can view main log	YES	YES	YES	YES	NO	NO
2	JobScheduler Master Cluster	can view cluster status / information	YES	YES	YES	YES	YES	NO
		can terminate cluster member	YES	NO	NO	NO	NO	NO
		can restart cluster member	YES	NO	NO	NO	NO	NO
3	JobScheduler Universal Agent	can view status / information	YES	YES	YES	YES	YES	NO
		can stop	YES	NO	NO	NO	NO	NO
		can abort	YES	NO	NO	NO	NO	NO
		can restart	YES	NO	NO	NO	NO	NO
4	Daily Plan	can view status / information	NO	YES	YES	YES	YES	NO
5	History	can view	NO	YES	YES	YES	YES	YES
6	Order	can view status	NO	YES	YES	YES	YES	YES
		can start	NO	YES	YES	NO	NO	YES
		can update	NO	YES	YES	NO	NO	YES
		change time for ad hoc orders	NO	YES	YES	NO	NO	YES
		change parameter	NO	YES	YES	NO	NO	YES
		change start and end node	NO	YES	YES	NO	NO	YES
		can suspend / resume	NO	YES	YES	NO	NO	YES
		can delete ad hoc order / blacklisted order	NO	YES	YES	NO	NO	YES
		can view configuration	NO	YES	YES	YES	YES	NO
		can view history	NO	YES	YES	YES	YES	YES
		can view history log	NO	YES	YES	YES	YES	

Single Sign-On

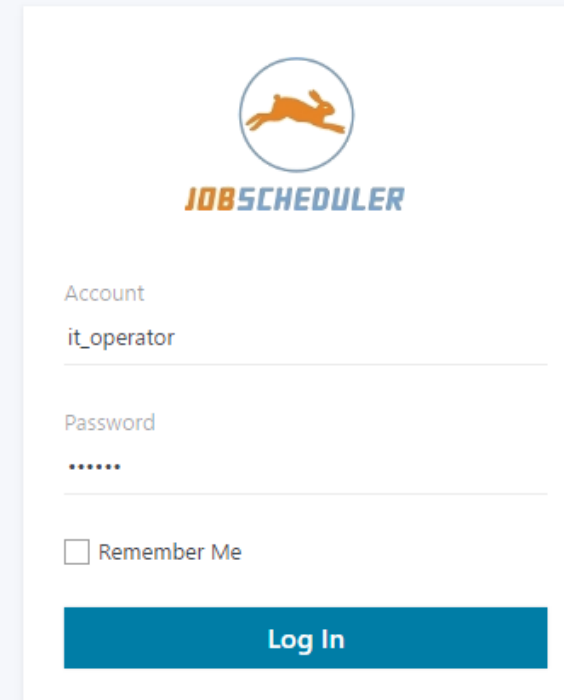
JOC Security Features

Authentication

- Direct authentication via LDAP is provided
- Alternatively use of a local `shiro.ini` file for authentication

Authorization

- Roles and Operations are predefined
- Permissions are configured for the roles in the local `shiro.ini` file
- Roles can be managed with the LDAP directory service by group membership of users
- Alternatively roles can be managed in the local `shiro.ini` file



The screenshot shows the login interface for JobScheduler. At the top center is the JobScheduler logo, which consists of a blue circle containing a yellow silhouette of a running animal, with the text 'JOBSCHEDULER' in blue below it. Below the logo are two input fields: 'Account' with the text 'it_operator' and 'Password' with masked characters '.....'. Below these fields is a checkbox labeled 'Remember Me'. At the bottom of the form is a blue button with the text 'Log In'.

Table of Contents

JOC Cockpit Visualization Features

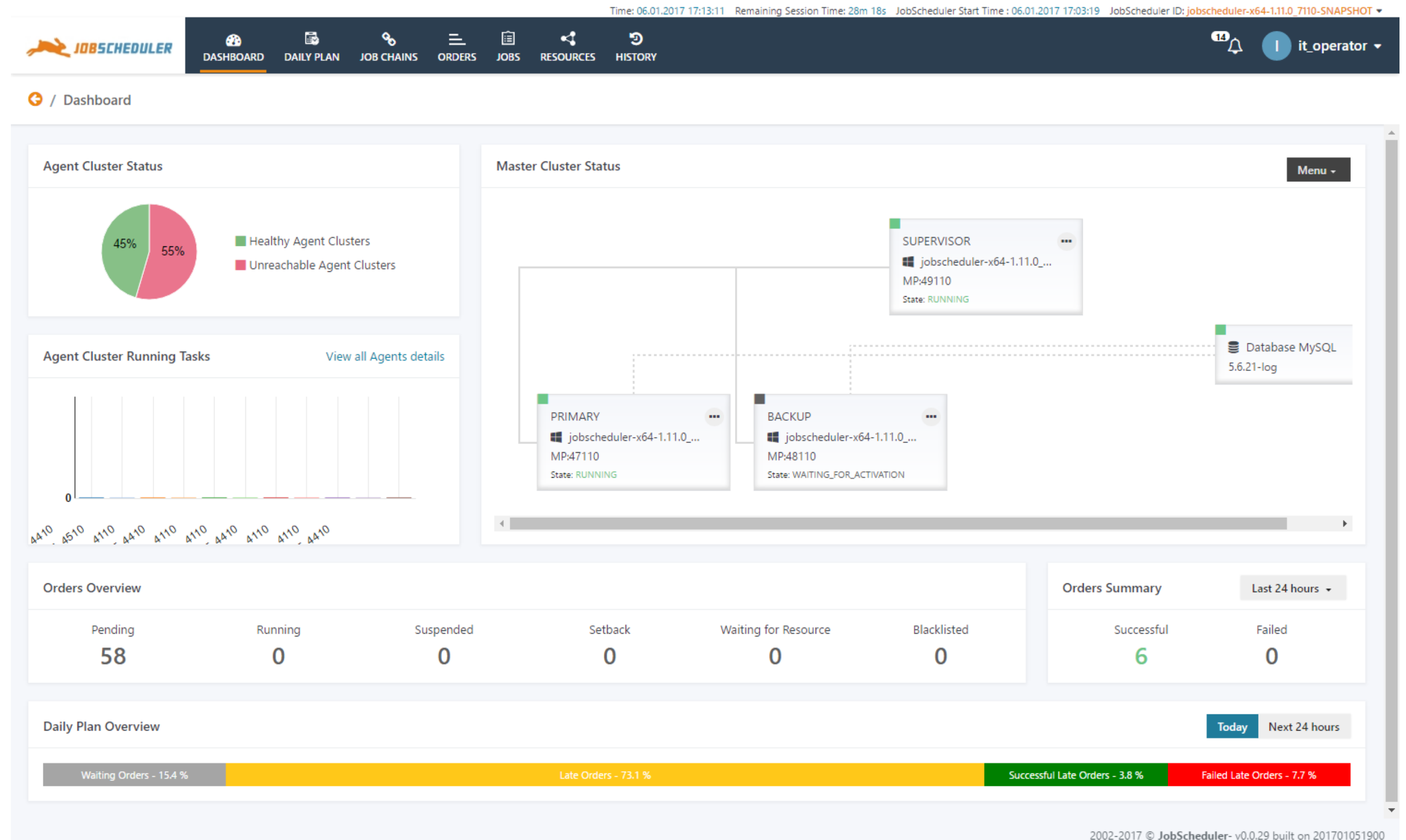
- Motivation for the JOC Cockpit
- JOC Cockpit Architecture
- JOC Cockpit Security Features
- JOC Cockpit Visualization Features
 - Dashboard
 - Daily Plan
 - Card View
 - Table View
 - Graphical View
 - Resources View
- JOC Cockpit Interaction Features

Dashboard

JOC Cockpit Visualization Features

Dashboard

- The Dashboard offers a comprehensive overview of most relevant information in the form of widgets
- Information in the Dashboard is updated automatically in near real-time
- The Dashboard shows the JobScheduler Master status including cluster information
- The Agent overview shows healthy and unhealthy Agent Clusters
- The Dashboard is a starting point to navigate to objects of interest, e.g. failed orders, suspended orders, late orders etc.



Card View: Quick Overview of Objects

JOC Cockpit Visualization Features

Card View

- The graphical card view shows a comprehensive list of objects and the most frequently used information
- Cards include the most frequently offered operations on objects for a single click
- Additional operations are available from context menus

The screenshot displays the 'JOB SCHEDULER' interface, specifically the 'Job Chains' page. The top navigation bar includes 'DASHBOARD', 'DAILY PLAN', 'JOB CHAINS' (selected), 'ORDERS', 'JOBS', 'RESOURCES', and 'HISTORY'. The user is logged in as 'it_operator'. The main content area shows a tree view on the left with folders like 'examples', 'sos', 'dailyplan', 'events', 'jade', 'notification', 'operations', 'criticalpath', and 'reporting'. The main view is a grid of cards for various job chains under the path '/sos/':

- /sos/dailyplan**
 - CheckDailyPlan**: 1 Job, 1 Order, 1 Pending, 0 Running, 0 Suspended. Buttons: Add Order, Show Calendar.
 - CreateDailyPlan**: 1 Job, 1 Order, 1 Pending, 0 Running, 0 Suspended. Buttons: Add Order, Show Calendar.
- /sos/events**
 - scheduler_event_service**: 1 Job, 1 Order, 1 Pending, 0 Running, 0 Suspended. Buttons: Add Order, Show Calendar.
- /sos/jade**
 - jade_history**: 1 Job, 0 Order, 0 Pending, 0 Running, 0 Suspended. Buttons: Add Order, Show Calendar.
 - jade_history_file_order**: 2 Jobs, 0 Order, 0 Pending, 0 Running, 0 Suspended. Buttons: Add Order, Show Calendar.
 - jade_history_receive**: 1 Job, 0 Order, 0 Pending, 0 Running, 0 Suspended. Buttons: Add Order, Show Calendar.
- /sos/notification**: (partially visible)

Table View: Job Chains

JOC Cockpit Visualization Features

Table View

- The table view shows a concise list of objects and important information
- The status of each object is visible including job chains, jobs, orders, tasks
- Operations are available by context menus for all visible objects
- The table view can be used for monitoring purposes as the view is updated automatically for tasks started and completed

Time: 06.01.2017 17:55:51 Remaining Session Time: 29m 56s JobScheduler Start Time : 06.01.2017 17:03:19 JobScheduler ID: jobscheduler-x64-1.11.0.7110-SNAPSHOT

JOBSCHEDULER DASHBOARD DAILY PLAN **JOB CHAINS** ORDERS JOBS RESOURCES HISTORY | it_operator

/ Job Chains All Job Chains Active Stopped Sort By Name Customization

Job Chain	Path	State	No. of Jobs	Agent Cluster	Order Pending	Order Running	Order Suspended	Order Waiting for Resource	Order Setbacks	Order Blacklisted	
▼ CheckDailyPlan	/sos/dailyplan/CheckDailyPlan	active	1	-	1	0	0	0	0	0	...
▼ CheckHistory	/sos/notification/CheckHistory	active	1	-	1	0	0	0	0	0	...
▼ CleanupNotifications	/sos/notification/CleanupNotifications	active	1	-	1	0	0	0	0	0	...
▼ CreateDailyPlan	/sos/dailyplan/CreateDailyPlan	stopped	1	-	1	0	0	0	0	0	...
▼ jade_history - Import JADE history from order	/sos/jade/jade_history	active	1	-	0	0	0	0	0	0	...
▼ jade_history_file_order - Import JADE history files from ./jade_history directory	/sos/jade/jade_history_file_order	active	2	-	0	0	0	0	0	0	...
▼ jade_history_receive - Receive JADE history	/sos/jade/jade_history_receive	active	1	-	0	0	0	0	0	0	...
▲ Reporting	/sos/reporting/Reporting	active	3	-	0	1	0	0	0	0	...
State		Job					Job Status		Node Status		
facts		/sos/reporting/ReportingFacts									
	PID	Task ID	Cause	Order	Process Steps	Running Since					...
	15768	122756	ORDER		1	06.01.2017 17:55:40 (10sec)					...
aggregation		/sos/reporting/ReportingAggregation									
		Order: Reporting - running Running Since 06.01.2017 17:55:40(10sec) ...									
	PID	Task ID	Cause	Order	Process Steps	Running Since					...
	6084	122757	ORDER	Reporting	0	06.01.2017 17:55:49 (1sec)					...
plan		/sos/dailyplan/CheckDailyPlan									
							pending				

Table View: Job Chain Details

JOC Cockpit Visualization Features

Table View for Details

- The table view shows the detailed list of objects that are available for a single job chain
- This view can be used for monitoring purposes as the view is updated automatically for tasks started and completed

Time: 06.01.2017 17:57:40 Remaining Session Time: 29m 36s JobScheduler Start Time : 06.01.2017 17:03:19 JobScheduler ID: jobscheduler-x64-1.11.0.7110-SNAPSHOT

JOBSCHEDULER DASHBOARD DAILY PLAN JOB CHAINS ORDERS JOBS RESOURCES HISTORY

2 | it_operator

/ Job Chains / 02_JobChainB [Stop Job Chain] [Add an Order] [Show Calendar]

examples / 10_RemoteExecutionUniversalAgent / 02_JobChainB Job Chain Orders | Overview

Running On
/examples/10_RemoteExecutionUniversalAgent/JUA_WINDOWS_LUTEST_4410

<input type="checkbox"/>	State	Job	Job Status	Node Status	Next Node	Error Node	
<input type="checkbox"/>	Start	/sos/jitl/JobChainStart	pending	active	100	End_Err	...
<input type="checkbox"/>	100	/examples/10_RemoteExecutionUniversalAgent/02_TaskB1	pending	active	200	End_Err	...
<input type="checkbox"/>	200	/examples/10_RemoteExecutionUniversalAgent/02_TaskB2	pending	active	300	End_Err	...
<input type="checkbox"/>	300	/examples/10_RemoteExecutionUniversalAgent/02_TaskB3	pending	active	400	End_Err	...
<input type="checkbox"/>	400	/examples/10_RemoteExecutionUniversalAgent/02_TaskB4	pending	active	500	End_Err	...
<input type="checkbox"/>	500	/examples/10_RemoteExecutionUniversalAgent/02_TaskB5	pending	active	End_Suc	End_Err	...
<input type="checkbox"/>	End_Suc	/sos/jitl/JobChainEnd	running	active	Success	Error	...
<input type="checkbox"/>	End_Err	/sos/jitl/JobChainEnd Order: 02_daily_morning - waiting_for_agent Running Since 06.01.2017 17:57:16 (19sec) ...	running	active	Error	Error	...

History [View History](#)

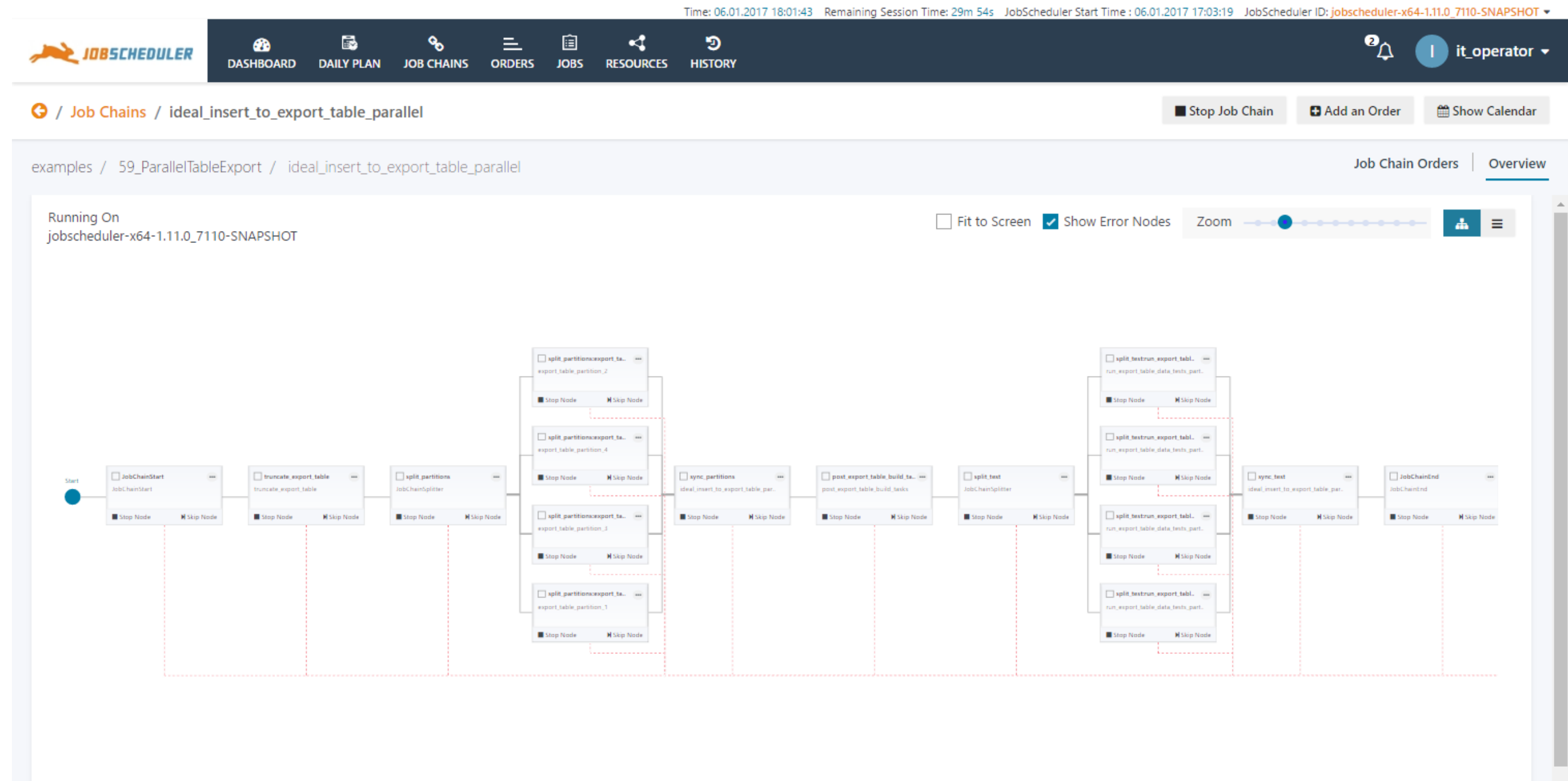
Order ID	Status	Start Time	End Time	Duration	Node
02_daily_morning	incomplete	06.01.2017 17:57:16	-	-	End_Err

Graphical View: Flow Charts

JOC Cockpit Visualization Features

Graphical Flow Chart

- The flow chart view shows a graphical representation of objects in a job chain
- Typical dependency patterns such as split & sync are considered
- The flow chart allows to zoom-in and zoom-out to make details visible
- All applicable operations on objects are available from the flow chart view, e.g. starting orders
- This view can be used for monitoring purposes as the view is updated automatically for tasks started and completed



Resources View: Agents, Locks, Schedules

JOC Cockpit Visualization Features

Resources View

- The resources view shows the status and availability of resources that are required to execute jobs
- Resources include Agents that operate on remote hosts, locks that apply mutual exclusion on jobs and schedules that specify common run-times
- The example shows a number of Agent Clusters that are partly available and partly unavailable

The screenshot displays the JOBSCHEDULER interface. At the top, there is a navigation bar with the JOBSCHEDULER logo and menu items: DASHBOARD, DAILY PLAN, JOB CHAINS, ORDERS, JOBS, RESOURCES (highlighted), and HISTORY. The user is logged in as 'it_operator'. The main content area shows the 'Resources / Agents' view. On the left, a tree view shows the hierarchy: / > examples > 08_FileWatchingRemoteFileProcessing > 10_RemoteExecutionUniversalAgent. The main area displays four agent clusters, each with a status indicator (red for unhealthy, green for healthy) and a list of statistics:

Cluster Path	Agent Name	Status	Total Agents	Running	Running Processes
/examples/08_FileWatchingRemoteFileProcessing	JUA_LINUX_GALADRIEL_4110	Unhealthy (S)	1	0	0
	JUA_LINUX_GOLLUM_4510	Unhealthy (S)	1	0	0
	JUA_WINDOWS_LUTEST_4410	Healthy (S)	1	1	0
/examples/10_RemoteExecutionUniversalAgent	JUA_LINUX_GALADRIEL_4110	Unhealthy (S)	1	0	0
	JUA_WINDOWS_LUTEST_4410	Healthy (S)	1	1	0

Table of Contents

JOC Cockpit Interaction Features

- Motivation for the JOC Cockpit
- JOC Cockpit Architecture
- JOC Cockpit Security Features
- JOC Cockpit Visualization Features
- JOC Cockpit Interaction Features
 - Manage related Objects
 - Query the Order History
 - Perform Bulk Operations
 - Adding Orders on-the-fly
 - Advanced Filtering and Customizations

Manage related Objects

JOC Cockpit Interaction Features

Interaction Features

- Users can navigate between related JobScheduler objects
- Example 1: From a job chain the user wants to see a specific order which triggers this job chain
- Example 2: A user sees that a job chain has not run successfully and wants to check out whether the specific JobScheduler Agent is available for which the job chain is scheduled

The screenshot displays the JobScheduler JOC Cockpit interface. At the top, there is a navigation bar with the JobScheduler logo and menu items: DASHBOARD, DAILY PLAN, JOB CHAINS, ORDERS, JOBS, RESOURCES, and HISTORY. The user is logged in as 'it_operator'. The main content area shows the 'Job Chains / 01_JADEFileTransfer' page. A breadcrumb trail indicates the path: examples / 06_JADEFileTransfer / 01_JADEFileTransfer. On the left, a pie chart shows 100% completion. Below it, a table lists the status of orders:

All Orders	5
Orders Pending	5
Orders Running	0
Orders Suspended	0
Orders Waiting for Resource	0
Orders Setback	0
Orders Blacklist	0

The main area displays five job chain orders, each with a checkbox, state (pending), next start time (never), and action buttons (Start Now, Suspend):

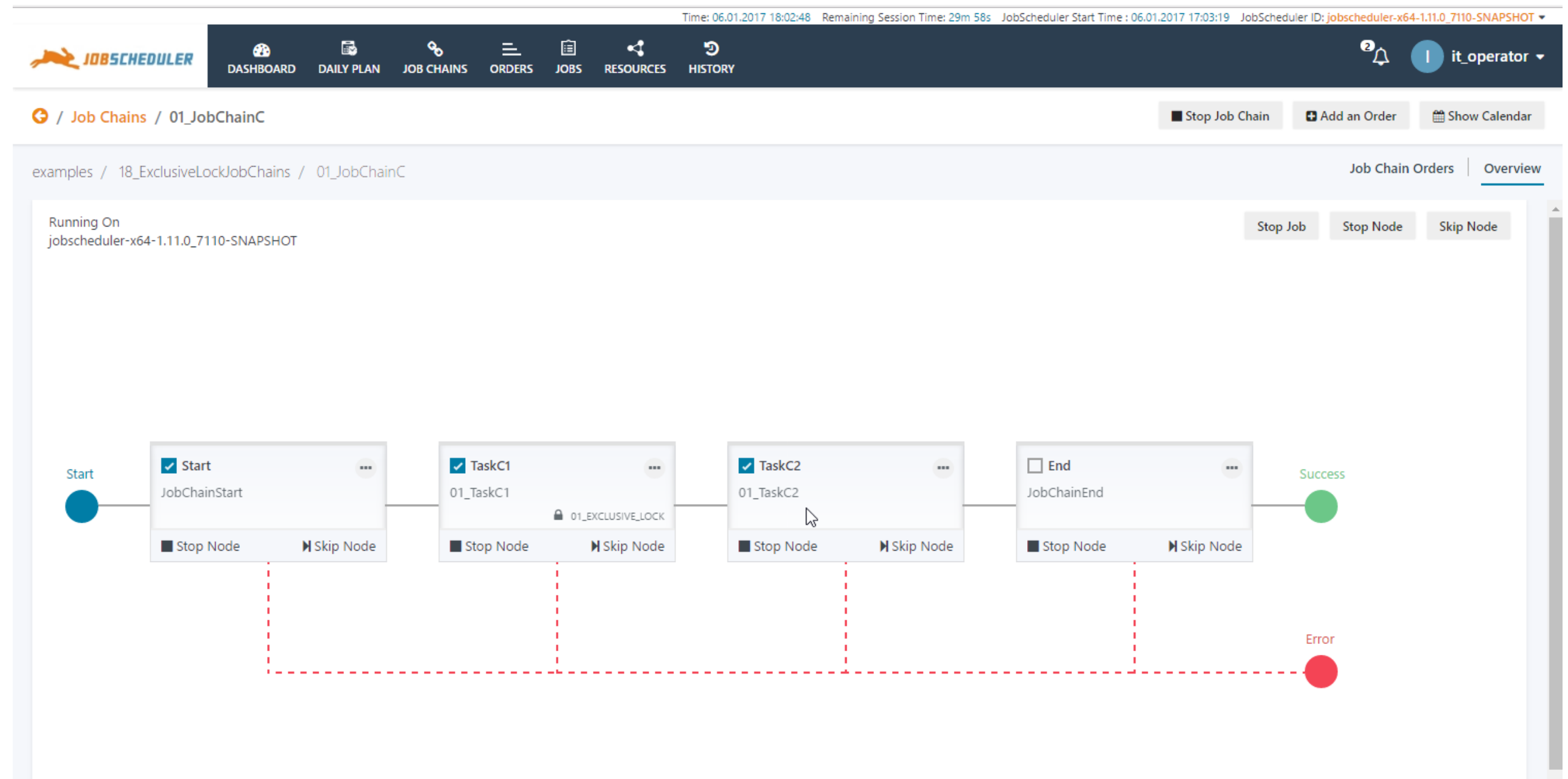
- 01_01_CopyLocalhost2Remote... (pending, never)
- 01_02_CopyRemoteServer2Lo... (pending, never)
- 01_03_CopyAndRenameLocah... (pending, never)
- 01_04_CopyServer2Server (pending, never)
- 01_05_PollingCopyRemoteSer... (pending, never)

Adding Orders on-the-fly (1/2)

JOC Cockpit Interaction Features

Adding Orders

- This example shows the graphical flow chart view of a job chain
- This view can be used as a starting point to add orders on-the-fly



Adding Orders on-the-fly (2/2)

JOC Cockpit Interaction Features

Adding Orders

- When adding an order then a pop-up window appears that allows to enter detailed information
- The order entry window is used by all views that allow to add orders on-the-fly

The screenshot displays the JOBSCHEDULER web interface. A pop-up window titled "Add New Order to /examples/18_ExclusiveLockJobChains/01_JobChainC" is open in the center. The window contains the following fields and options:

- Order ID: SOSTEST
- Order Title: THIS IS A TEST
- Start Time: Now Schedule for later
- Start step: Choose Starting State (dropdown)
- End step: Choose End State (dropdown)
- Name: my_param
- Value: value100
- Buttons: Submit Order, Cancel
- Link: Add another Parameter

The background interface shows a job chain diagram with nodes labeled "Start", "JobChainStart", and "01_T...". The diagram includes "Stop Node" and "Skip Node" options for each step. The top navigation bar includes "DASHBOARD", "DAILY PLAN", and "JOB CHAINS". The user is logged in as "it_operator".

Advanced Filtering and Customizations

JOC Cockpit Interaction Features

Advanced Filtering and Customizations

- This example shows the filtering for the Order History
- Time ranges can be specified as well as JobScheduler objects being selected for granular filtering
- Filters help to create customized work views for individuals or a team

The screenshot displays the JobScheduler Cockpit interface. A 'Create Customization' dialog box is open, allowing users to define filters for the Order History. The dialog box contains the following fields:

- Customization Name:** DailyProcessing
- Regex:** Regular expression or choose folders from tr (with a folder icon)
- Process executed:** now-600, today or 08:00am to 08:00pm
- Status:** Incomplete, Successful, Failed

The background shows the 'History' table with columns for Order ID, Job Chain, Status, Start Time, End Time, Duration, and End Node. The table is filtered to show only 'successful' entries. The 'Order' tab is selected, and the 'Task' tab is also visible. The user 'it_operator' is logged in, and the session time is 29m 58s.

Order ID	Job Chain	Status	Start Time	End Time	Duration	End Node
Reporting	/sos/reporting/Reporting	successful	06.01.2017 17:13:27	06.01.2017 17:13:52	25 sec	success
Reporting	/sos/reporting/Reporting	successful	06.01.2017 17:10:59	06.01.2017 17:11:27	28 sec	success
Reporting	/sos/reporting/Reporting	successful	06.01.2017 17:08:32	06.01.2017 17:08:59	27 sec	success
Reporting	/sos/reporting/Reporting	successful	06.01.2017 17:06:01	06.01.2017 17:06:17	16 sec	success
Reporting	/examples/01_JobChainShellJobs/01_JobChainA	successful	06.01.2017 17:05:58	06.01.2017 17:08:13	2m 15s	Success
Reporting	/sos/reporting/Reporting	successful	06.01.2017 17:05:58	06.01.2017 17:06:32	34 sec	success
Reporting	/sos/reporting/Reporting	successful	28.12.2016 19:32:31	28.12.2016 19:32:57	26 sec	success
Reporting	/sos/reporting/Reporting	successful	28.12.2016 19:08:11	28.12.2016 19:08:38	27 sec	success



Questions?
Comments?
Feedback?

Software- und
Organisations-
Service GmbH

Giesebrechtstr. 15
D-10629 Berlin

info@sos-berlin.com
<http://www.sos-berlin.com>