



JS7 JobScheduler Architecture

Implementation Architecture:
Components & Services

Information for
Interested Parties



■ Workflows and Orders

- Basic System Architecture
- Workflows
- Orders

■ Controller and Agent Implementation Architecture

- Controller Cluster
- Controller Journal
- Controller / Agent

■ JOC Cockpit Implementation Architecture

- JOC Cockpit Cluster
- JOC Cockpit Services
- JOC Cockpit Background Services
- JOC Cockpit Proxy Service

System Architecture

Basic System Architecture

JOC Cockpit

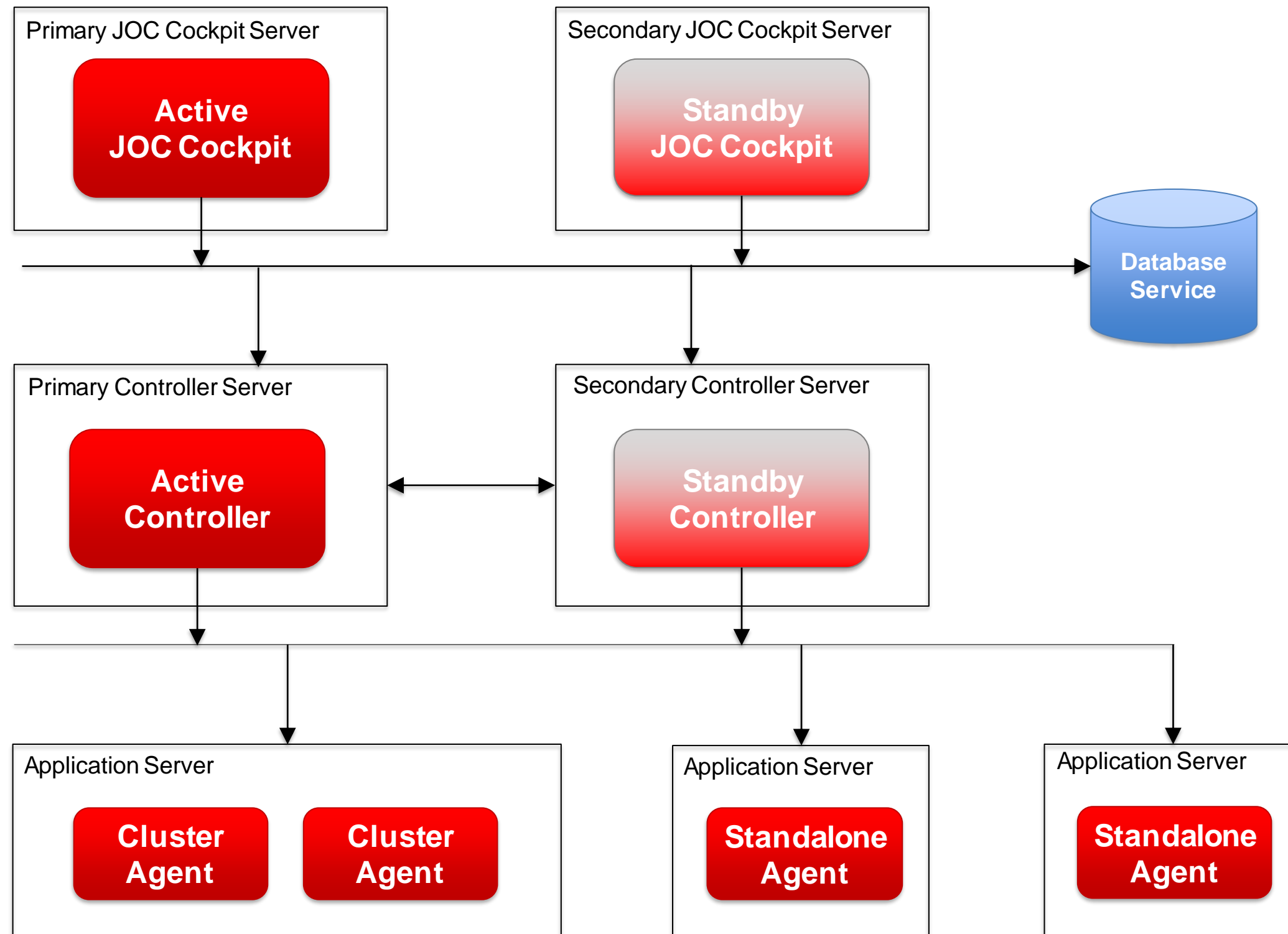
- JOC Cockpit is operated as a passive cluster and serves the User Interface and REST Web Service
- JOC Cockpit Services make use of a database for restart capabilities

Controller / Agents

- The Controller is operated as a passive cluster to orchestrate Agents
- Agents receive workflow configurations from a Controller, execute jobs autonomously and report back execution results
- Agents are operated as a cluster or standalone

Connections

- Communication between components within the scope of the indicated network connections



Workflows

JOC Cockpit / Web Service

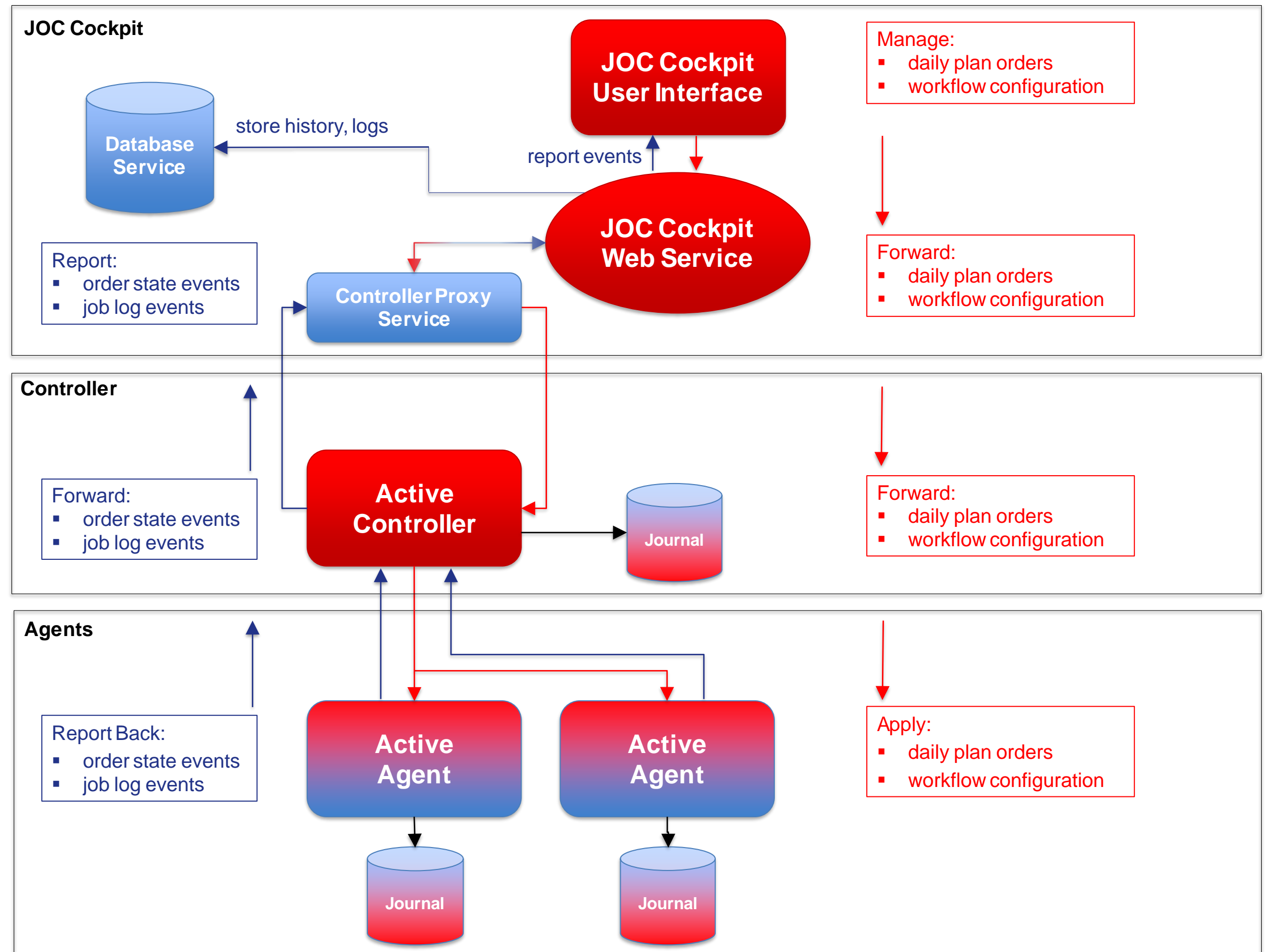
- JOC Cockpit manages the job inventory, workflows and the daily plan that are forwarded to a Controller
- During workflow execution JOC Cockpit receives job log output and order state events in near real-time

Controller

- The Active Controller checks and forwards the daily plan, and workflow configuration to connected Agents

Agent

- Agents are used to execute workflows and jobs:
 - any job in a workflow can be executed with any connected Agent
 - Agents execute workflows autonomously within the scope of the daily plan
 - Agents report back to the Controller any log output and any events, e.g. starting or completing a task



Orders

JOC Cockpit / Web Service

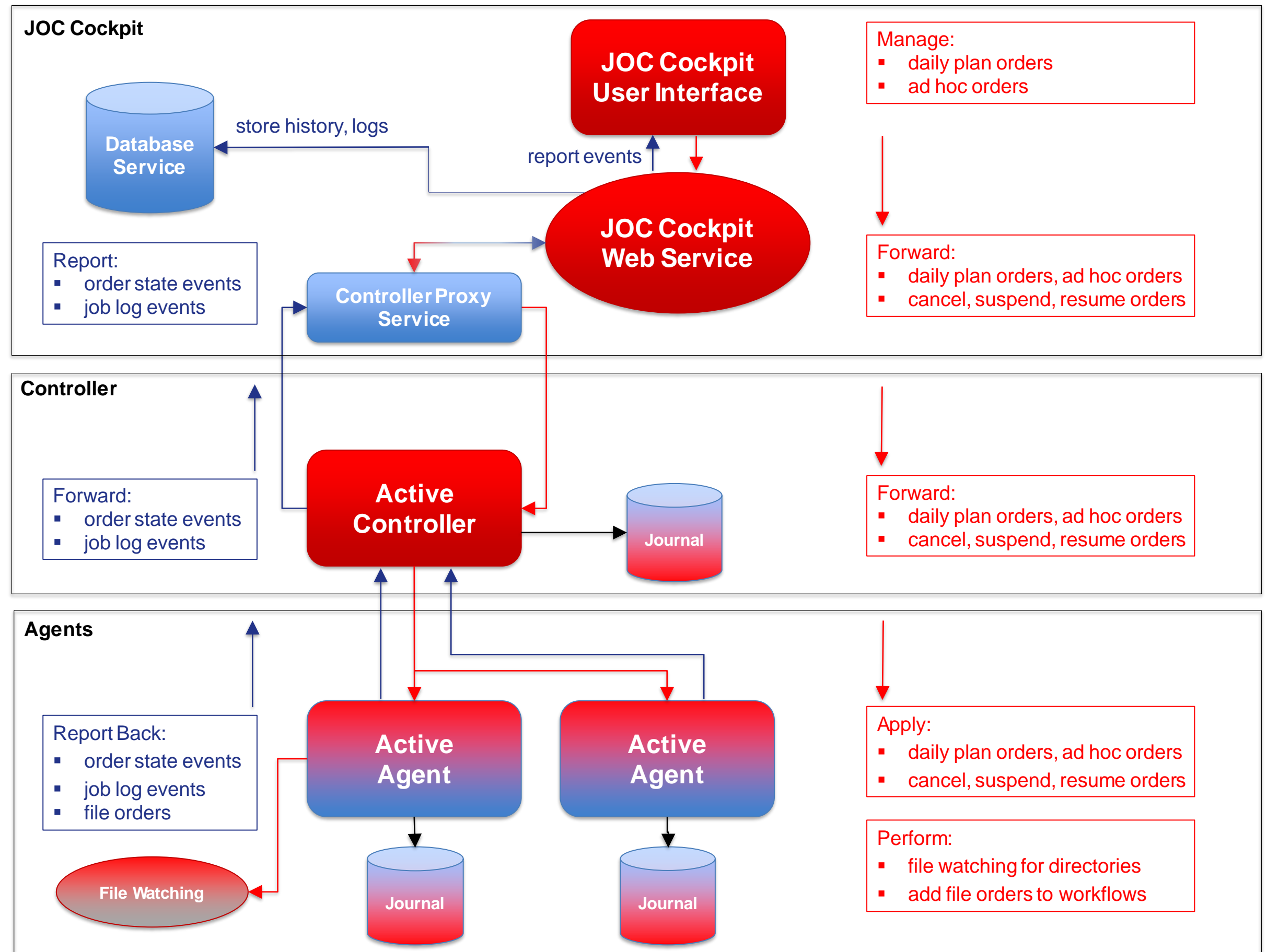
- JOC Cockpit manages daily plan orders and temporary ad hoc orders
- Orders are submitted to a Controller for workflow execution with Agents

Controller

- The Active Controller forwards daily plan orders and ad hoc orders to connected Agents

Agent

- Agents execute jobs in a workflow autonomously triggered by orders
- Agents report back the resulting order state transition events and log output events
- Agents watch directories for incoming files and create file orders
- Agents handle in parallel any number of orders for the same workflow or for different workflows





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Communication

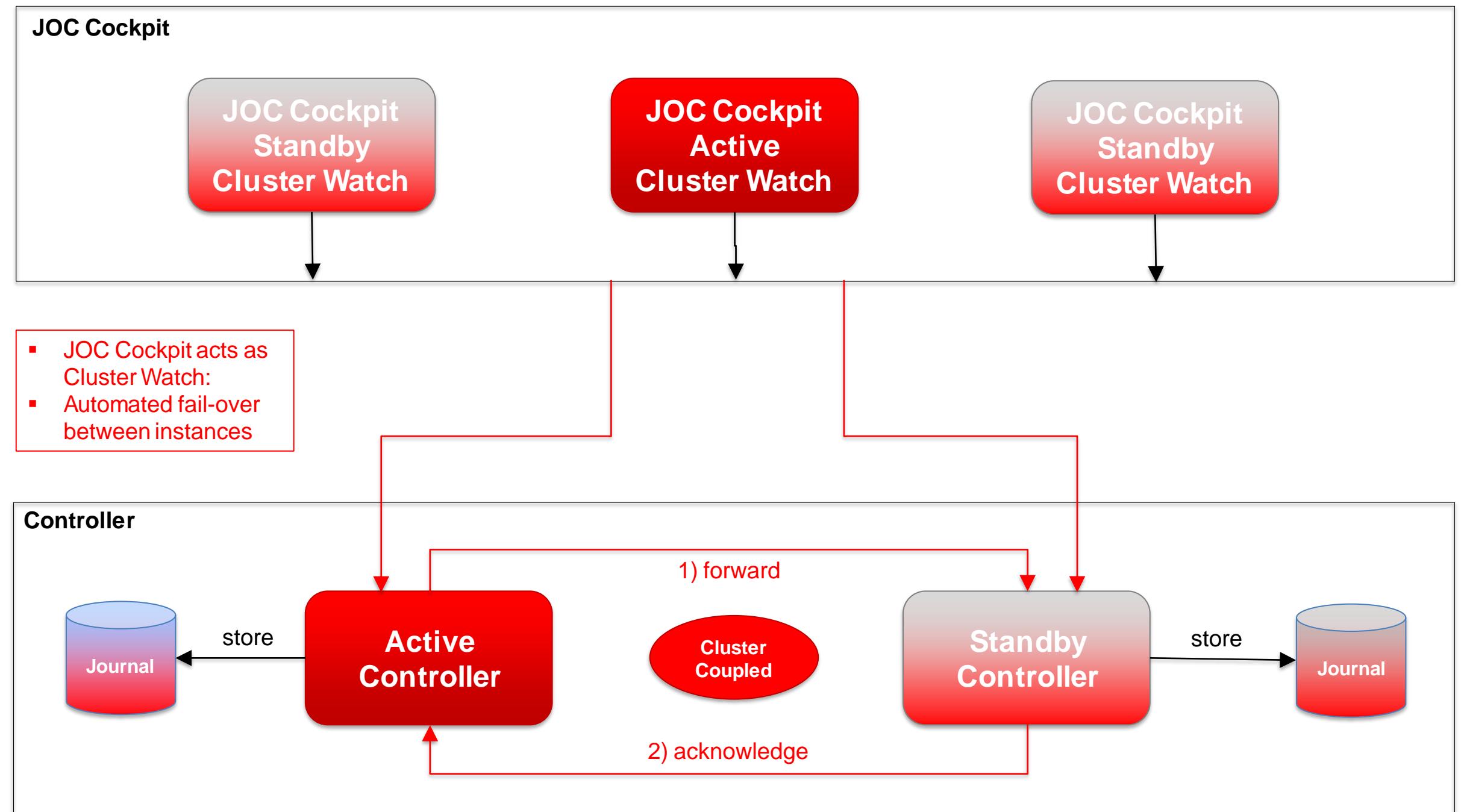
- Both Active/Standby Controller instances establish HTTP(S) connections to each other

Coupling

- The Active Controller adds changes to objects and order state transitions to its journal and forwards them to the Standby Controller instance
- The Standby Controller adds such information to its journal and acknowledges receipt
- When Active and Standby Controller instances are in sync then the Cluster is considered being coupled
- Recoupling occurs as needed

Fail-over

- In case of failure of a Controller instance or connection the Cluster Watch is consulted to determine which Controller instance should take over the active role
- Fail-over occurs within 15s



Communication

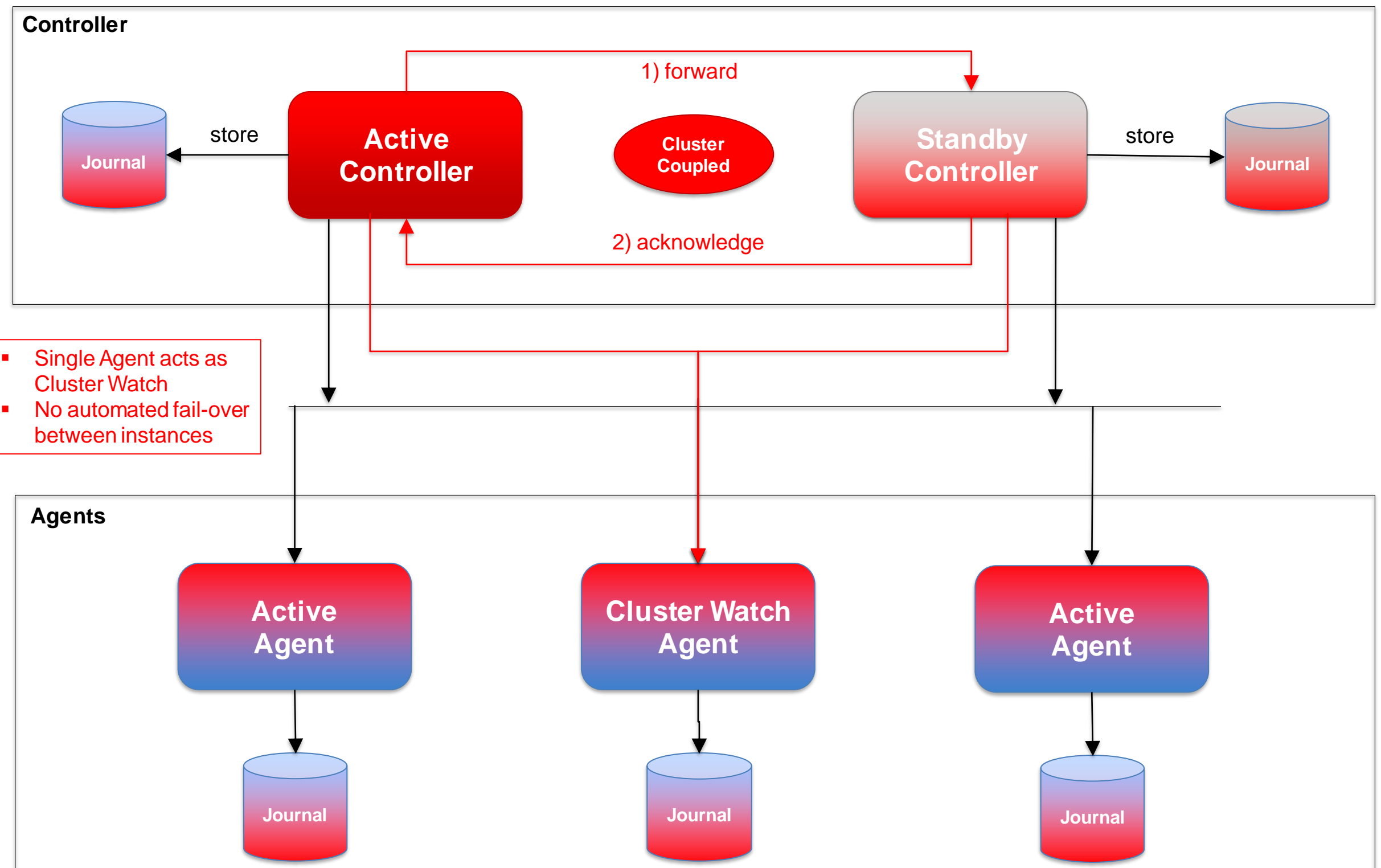
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Fail-over

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Journal

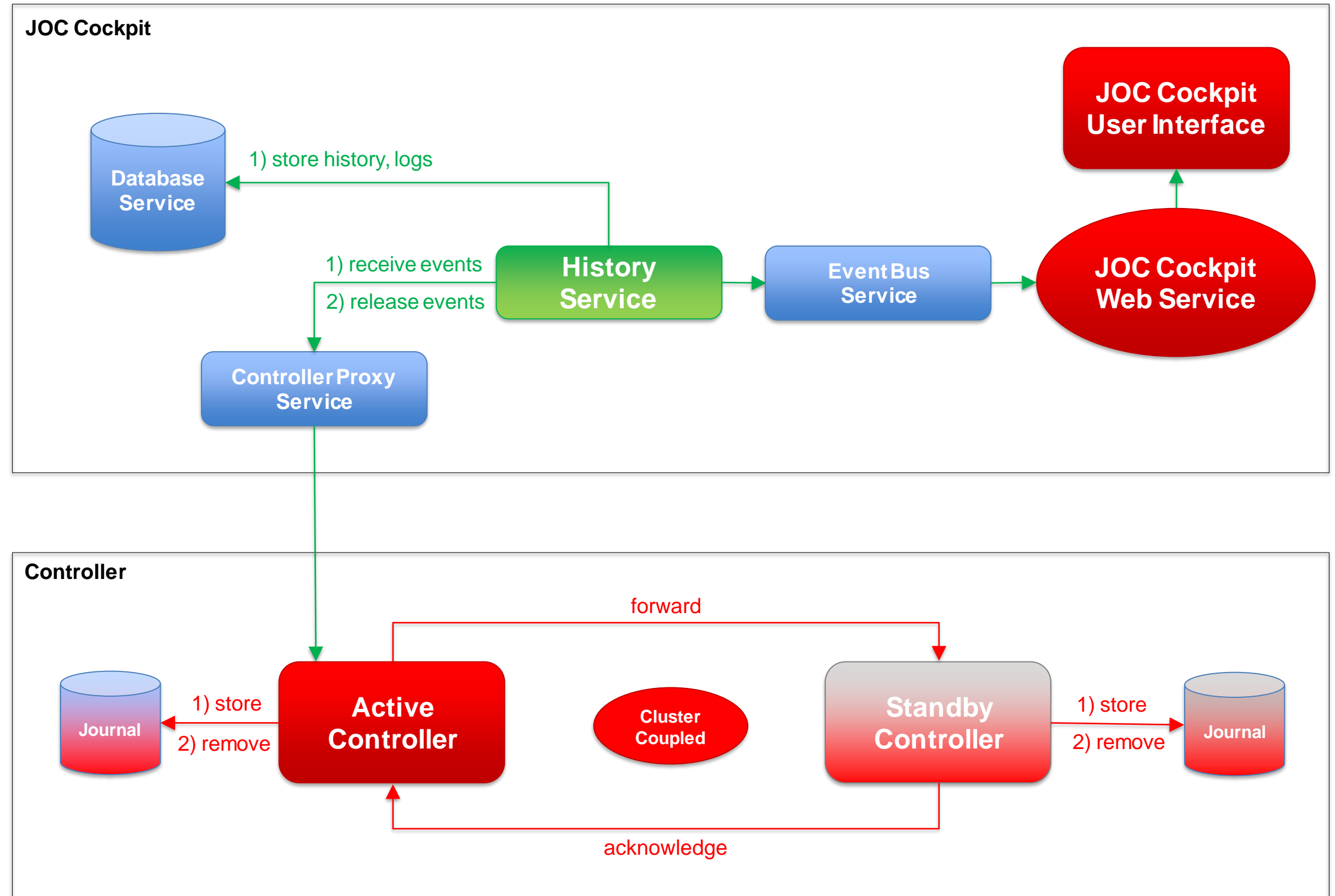
- The Journal holds objects, order state transition events and log events of a Controller
- Such objects are synchronized with the Standby instance

History Service

- The History Service subscribes to events of the Controller
- Having received events and having stored them to the database the service forwards events to the GUI and instructs the Controller to release events

Controller

- Events are originally stored to the Journal after receipt from an Agent or originating from workflow instructions
- Events are removed from the Journal when released by the Controller
- Journal size can grow with the number of objects and orders but will shrink when orders are completed



Controller

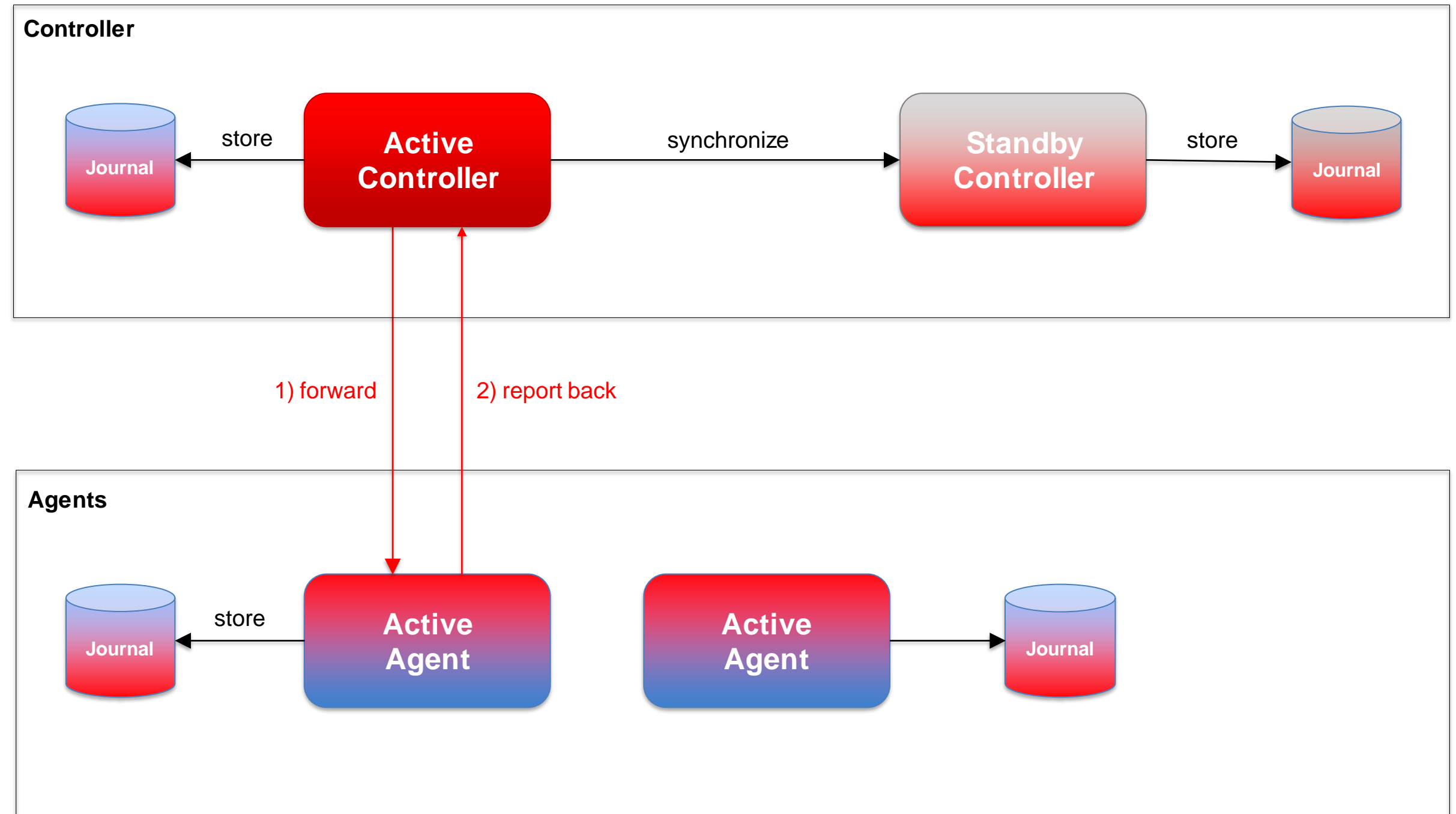
- The Controller instances store workflow configurations and order state transitions in their journals for synchronization
- These objects are passed asynchronously to Agents

Agent

- Agents receive objects and store them in a journal
- Agents execute jobs independently from an active connection to a Controller
- Agents report back the resulting order state events and log events, e.g. after job completion

Communication

- If Controller, Agent or the connection between them fail then they will reconnect
- Communication recovers in case of longer outages for hours and days



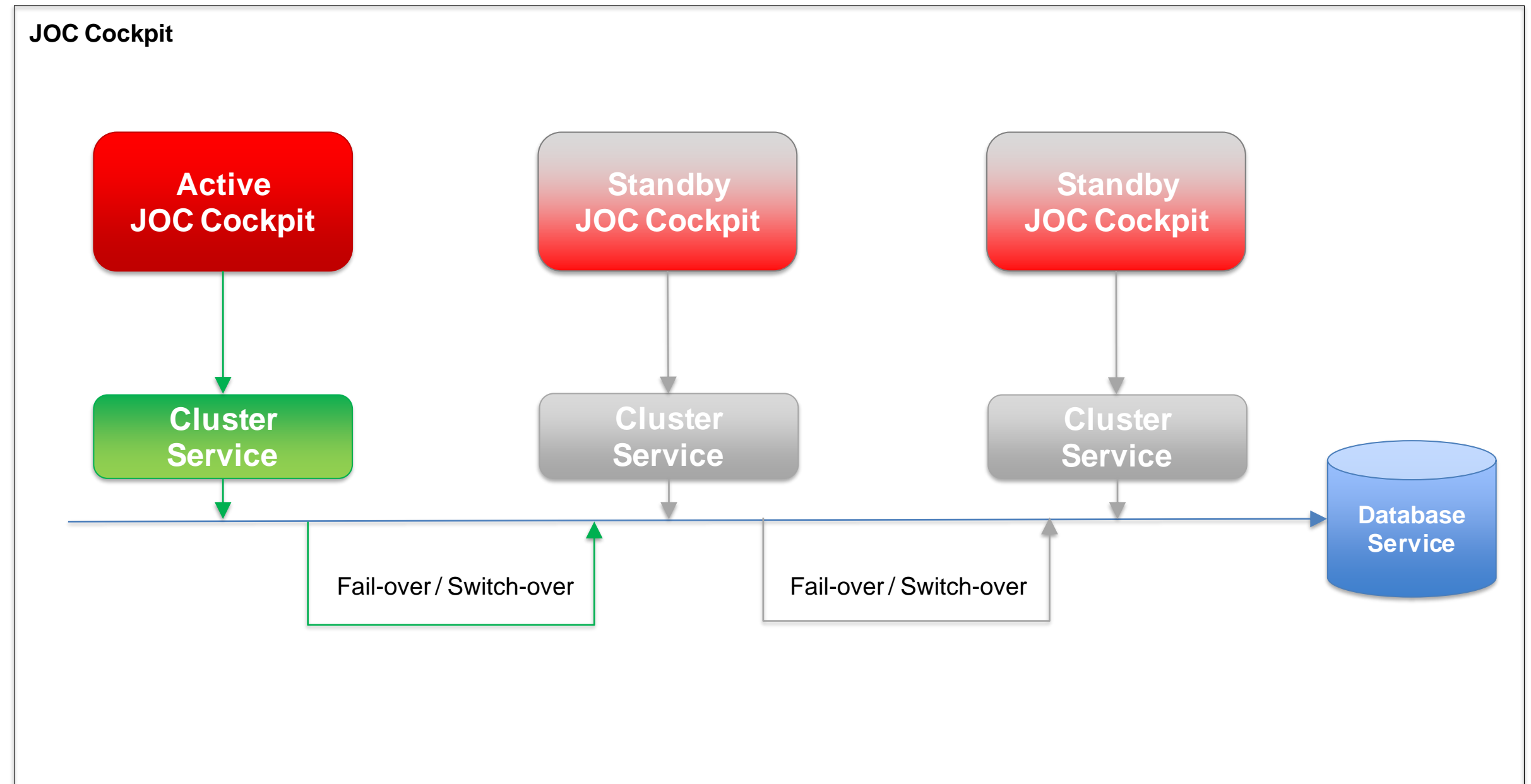


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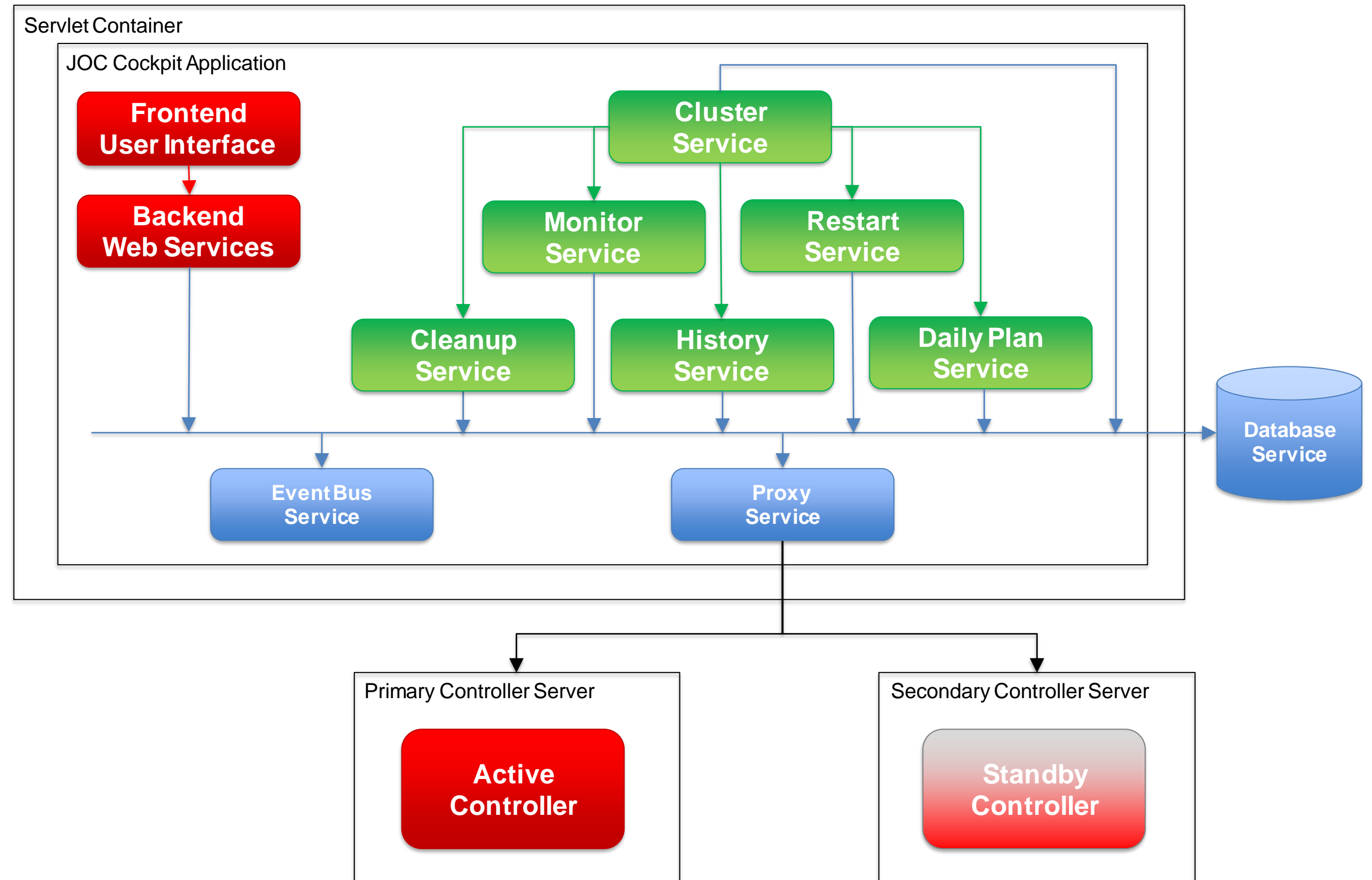
- **Controller and Agent Implementation Architecture**
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- **JOC Cockpit Implementation Architecture**
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- Cluster Service instances are synchronized by use of the database to which they send heartbeats and check availability of each other instance
- In case of failure one of the remaining instances will perform a cluster fail-over operation
- Users can perform a switch-over operation by selecting the next active JOC Cockpit instance
- In case of switch-over the Cluster Service will stop any running Background Services normally
- For fail-over / switch-over the Background Services are started from the Cluster Service of the next active JOC Cockpit instance

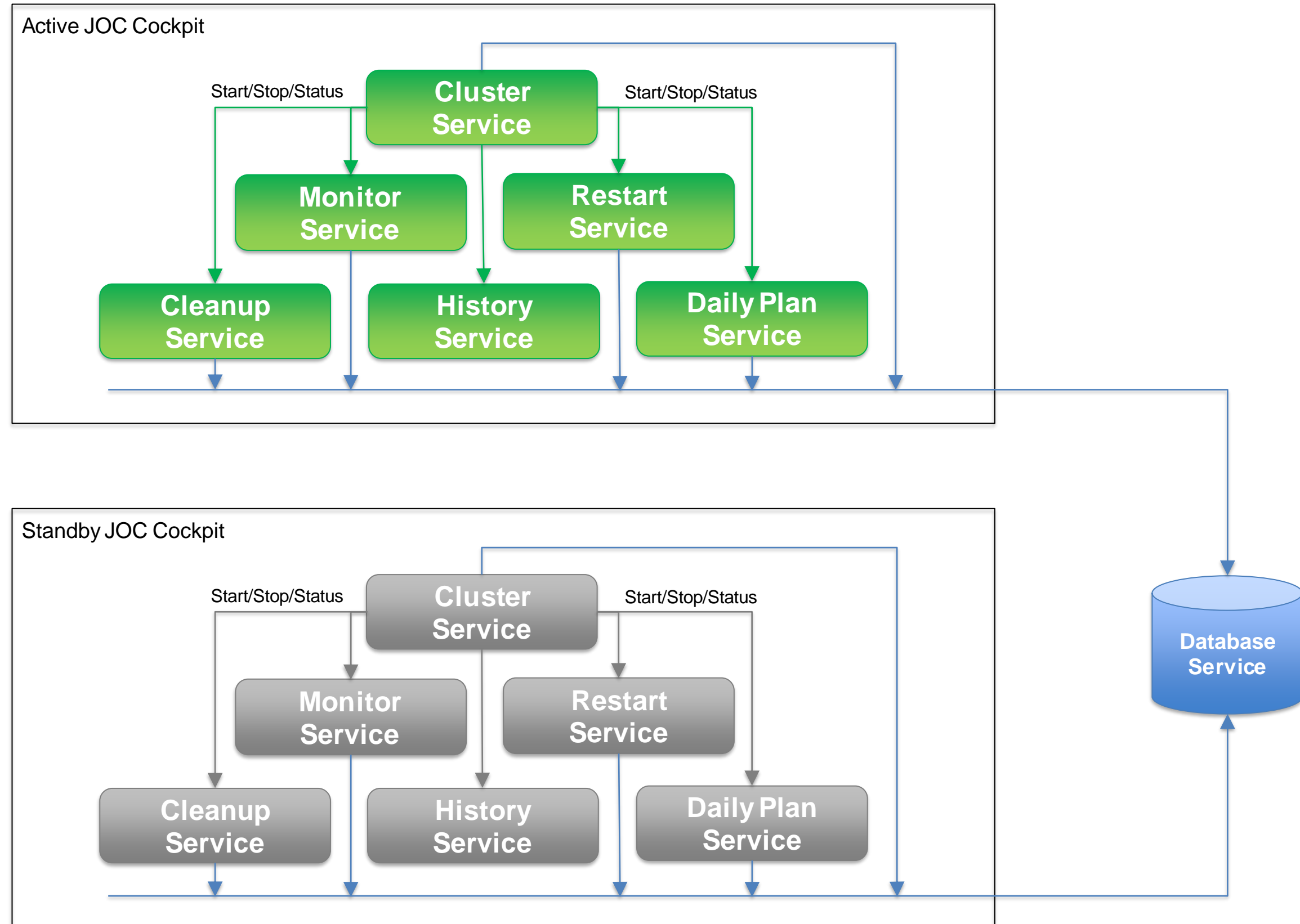


- JOC Cockpit application is operated in a servlet container
- Frontend User Interface for browser access
- Backend Web Services provide information to the GUI frontend
- The Cluster Service manages a number of Background Services for housekeeping, history and daily plan management
- Communication between Backend Web Services and Background Services is based on an Event Bus
- The Proxy Service reports order state transitions occurring in a Controller or Agent
- Any JOC Cockpit service can access the database service to store and to retrieve information

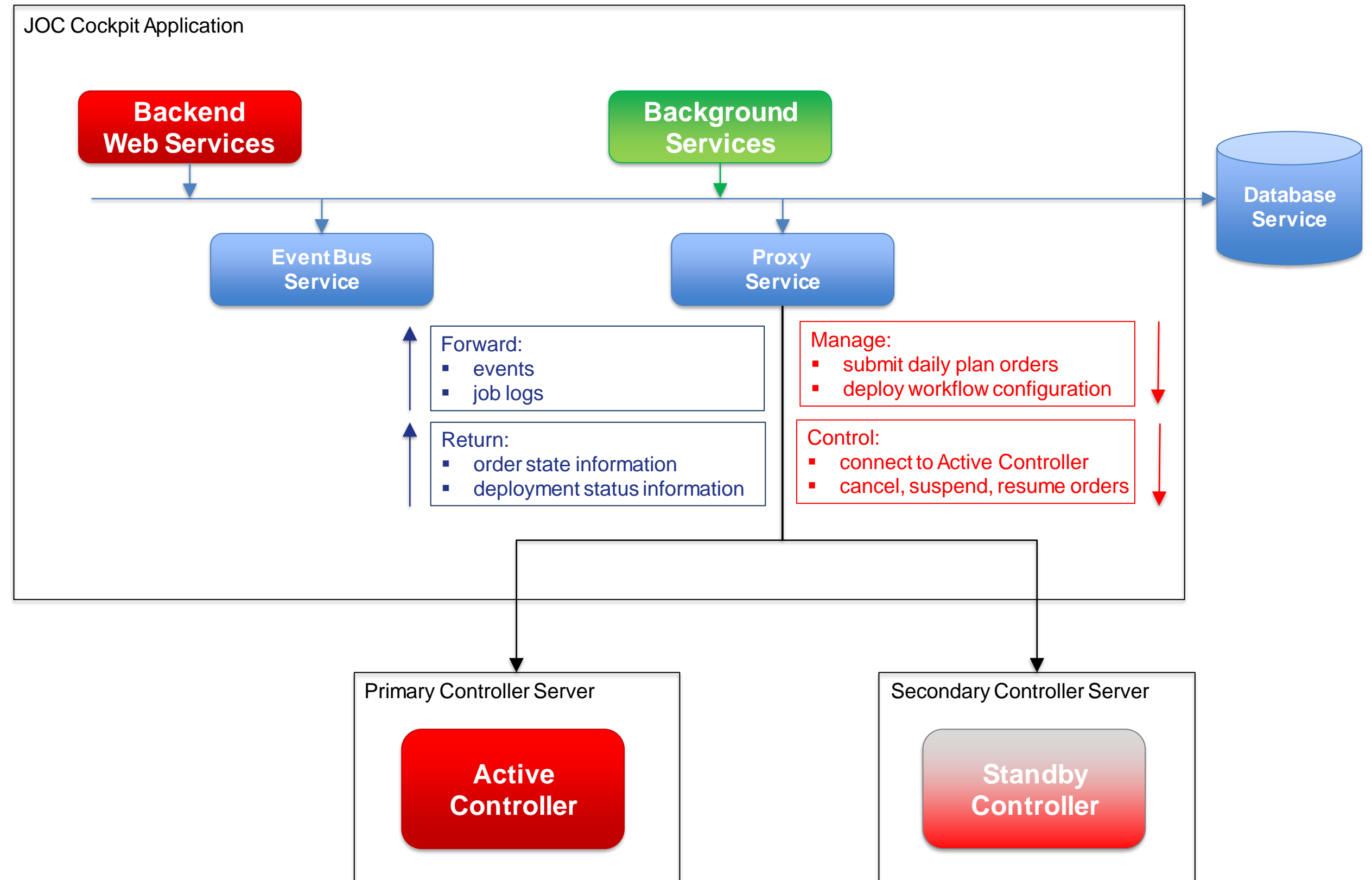


JOC Cockpit clustered Background Services

- The Cluster Service manages Background Services running in the servlet container
- Background Services are started, stopped etc.
- Cluster Service manages fail-over to the next JOC Cockpit instance in case of service failure
- Monitor Service notifies about failed jobs and component failures etc.
- Restart Service reruns pending deployments and performs synchronization with a Controller
- Cleanup Service purges the database, e.g. to limit the size of the history
- History Service retrieves execution results and logs from a Controller instance
- Daily Plan Service creates and submits orders to connected Controllers



- The Proxy connects to the active Controller, supports fail-over and manages asynchronous messages
- The Proxy deploys configuration objects, submits orders to the Controller
- The Proxy handles asynchronous operations such as cancel, suspend, resume etc. for orders with the Controller
- The Proxy returns the order state and deployment status of objects
- The Proxy forwards asynchronous events including order state transitions and log output of jobs from the Controller
- Information returned or forwarded by the Proxy is added to the Event Bus





Questions?
Comments?
Feedback?

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