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Ecomm CDC on CRC: Architecture and Troubleshooting

This document captures the current architecture, GitOps layout, Jenkins automation, and the most common troubleshooting steps we used while stabilizing the pipeline on CRC.

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Quick Start

Fastest path to run everything (Jenkins):

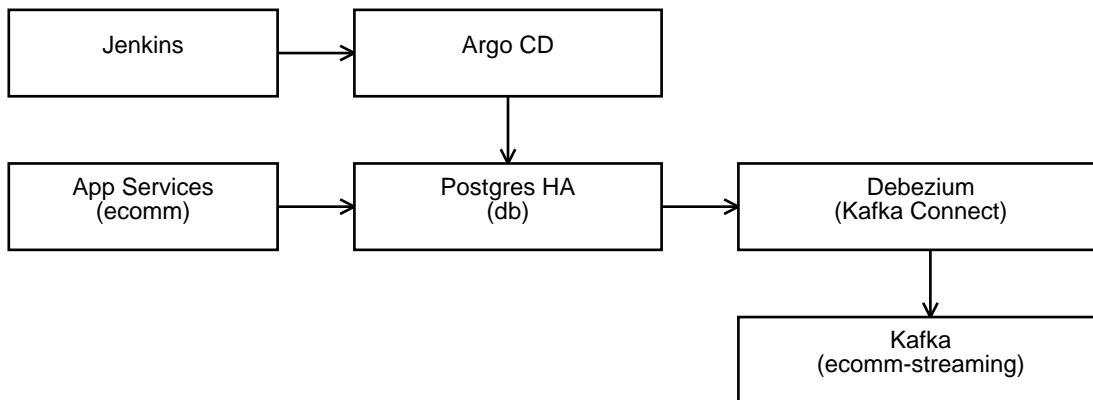
1. Open the Jenkins pipeline.
2. Set:
 - `RUN_ALL=true`
 - `SKIP_BUILD=true`
3. Build with parameters.

Fastest path to verify via CLI:

```
...
oc -n db get jobs -l argocd.argoproj.io/instance=ecomm-db -o wide
oc -n ecomm-streaming get kafkaconnector ecomm-outbox \
-o jsonpath='{range .status.conditions[*]}.{type}{" "}{.status}{" "}{.message}{"\n"}{end}'
oc -n ecomm-streaming exec ecomm-kafka-ecomm-kafka-pool-0 -- \
/opt/kafka/bin/kafka-topics.sh \
--bootstrap-server ecomm-kafka-kafka-bootstrap.ecomm-streaming.svc.cluster.local:9092 \
--list | sort | grep '^ecomm\.'
...
```

Architecture Diagram

Architecture (CRC)



Architecture Overview

Components and namespaces:

- OpenShift Local (CRC) single-node cluster
- `openshift-gitops` namespace
- Argo CD (OpenShift GitOps operator)
- `cicd` namespace
- Jenkins (pipeline runner)
- `ecomm` namespace
- App services (cart, catalog, orders, payment, shipping)
- `db` namespace

- PostgreSQL HA (Patroni/Crunchy)
- `ecomm-streaming` namespace
- Strimzi Kafka + Kafka Connect
- Debezium Outbox connector

High-level data flow:

1. App outbox tables are written in PostgreSQL.
2. Debezium Postgres connector reads outbox tables.
3. Event Router SMT routes events to topic names derived from `aggregate_type`.
4. Topics appear in Kafka and can be consumed by downstream consumers.

GitOps Layout

Main GitOps repo:

- `/Users/printeshpatel/Downloads/ecomm-cdc-gitops`

Argo CD Applications:

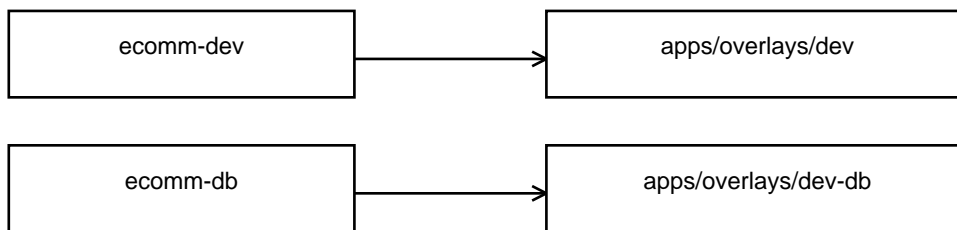
- `argocd/10-app-ecomm-dev.yaml`
 - Source: `apps/overlays/dev`
 - Manages app services, routes, connector
- `argocd/11-app-ecomm-db.yaml`
 - Source: `apps/overlays/dev-db`
 - Manages DB jobs and test SQL configmap

Overlays:

- `apps/overlays/dev`
 - App services and connector
 - No DB jobs (moved to dev-db)
- `apps/overlays/dev-db`
 - `outbox-db-init` Job
 - `outbox-smoke-test` Job
 - `outbox-test-sql` ConfigMap

GitOps application split:

GitOps App Split



Jenkins Pipeline

Jenkins repo:

- `/Users/printeshpatel/Downloads/ecomm-cdc-microservices`

Pipeline parameters (Jenkinsfile):

- `RUN_ALL` runs DB init, connector restart, smoke test, and topic verification
- `SKIP_BUILD` skips image builds
- `RUN_DB_INIT` reruns the DB init job
- `RESTART_CONNECTOR` bumps the Strimzi restart annotation
- `RUN_SMOKE_TEST` reruns outbox smoke test
- `VERIFY_TOPICS` checks Kafka topics
- `TOPIC_PREFIX` default `ecomm`

Pipeline behavior:

- Updates GitOps repo files to trigger Argo sync
- Deletes existing DB jobs before rerun to avoid immutable field errors
- Uses RFC3339 timestamp for `strimzi.io/restart`

Outbox and Debezium Configuration

Outbox tables:

- `cart.outbox_event`
- `catalog.outbox_event`
- `orders.outbox_event`
- `payment.outbox_event`
- `shipping.outbox_event`

Connector config:

- Publication autcreate disabled
- Publication created by DB init job
- Outbox SMT enabled
- Topic names are derived from `aggregate_type`

Expected topics after smoke test:

- `ecomm.cart.CartCheckedOut.v1`
- `ecomm.orders.OrderCreated.v1`
- `ecomm.orders.OrderPaid.v1`
- `ecomm.payment.PaymentAuthorized.v1`
- `ecomm.payment.PaymentFailed.v1`
- `ecomm.shipping.ShipmentCreated.v1`
- `ecomm.public.orders` may also appear from base CDC config

Sync Order

DB app `ecomm-db` sync waves:

- `outbox-db-init` Job: `sync-wave: -2`
- `outbox-smoke-test` Job: `sync-wave: 0`

App app `ecomm-dev`:

- Connector sync-wave: `-1`

Order of execution:

1. DB init job
2. Connector apply/restart
3. Smoke test job

Common Issues and Fixes

Argo UI shows no jobs

Cause:

- Jobs are in namespace `db` and were previously hook resources or filtered out

Fix:

- Use `ecomm-db` app in Argo UI
- Switch to List view
- Filter Namespace to `db`

CLI validation:

```

```
oc -n db get jobs -l argocd.argoproj.io/instance=ecomm-db -o wide
```

```

Argo UI "permission denied" or "Failed to load data"

Cause:

- Argo RBAC default policy set to empty

Fix (CR-managed RBAC):

```
oc -n openshift-gitops patch argocd openshift-gitops --type merge -p
'{"spec":{"rbac":{"defaultPolicy":{"role:admin","policy":{"g, system:cluster-admins, role:admin\ng,
cluster-admins, role:admin\ng, kubeadmin, role:admin\ng, system:authenticated,
role:admin\n"},"scopes":["groups"]}}}}'
oc -n openshift-gitops rollout restart deployment/openshift-gitops-server
oc -n openshift-gitops rollout restart deployment/openshift-gitops-dex-server
```

Kustomize build error "file is not in or below"

Cause:

- `dev-db` overlay referenced files outside its directory

Fix:

- Copy job and configmap files into `apps/overlays/dev-db`
- Keep `dev-db/kustomization.yaml` self-contained

Job cannot be reapplied, immutable template error

Cause:

- Kubernetes Jobs are immutable once created

Fix:

- Delete job and pods before reapplying
- Pipeline now deletes jobs before rerun

Job failed to mount DB secret

Cause:

- Used wrong secret name (`pg-ha-pguser-postgres`)

Fix:

- Use `pg-ha-pguser-pg-ha` in job env

Debezium connector NotReady, publication errors

Cause:

- Connector tried to autcreate publication without table ownership

Fix:

- Set `publication.autocreate.mode: disabled`
- Use DB init job to create publication
- Ensure DB user owns schemas/tables or has required privileges

Debezium SMT timestamp error

Error:

- `Field 'created_at' is not of type INT64`

Fix:

- Remove `transforms.outbox.table.field.event.timestamp` mapping

ImagePullBackOff for app pods

Cause:

- Private GHCR images or missing credentials

Fix:

- Use OpenShift internal registry
- Or create registry pull secret and attach to service account

Operational Commands

Argo app status:

```
oc -n openshift-gitops get applications.argoproj.io
```

...

Force Argo refresh:

...

```
oc -n openshift-gitops annotate application ecomm-db argocd.argoproj.io/refresh=hard --overwrite
```

...

Force Argo sync to latest revision:

...

```
SHA=$(git -C /Users/printeshpatel/Downloads/ecomm-cdc-gitops rev-parse HEAD)
```

```
oc -n openshift-gitops patch application ecomm-db --type merge -p
```

```
"{\"operation\":{\"sync\":{\"revision\":\"$SHA\",\"prune\":true}}}"
```

...

Kafka topics check:

...

```
oc -n ecomm-streaming exec ecomm-kafka-ecomm-kafka-pool-0 -- \
/opt/kafka/bin/kafka-topics.sh \
--bootstrap-server ecomm-kafka-kafka-bootstrap.ecomm-streaming.svc.cluster.local:9092 \
--list | sort | grep '^ecomm\.'
```

...

Connector health:

...

```
oc -n ecomm-streaming get kafkaconnector ecomm-outbox \
```

```
-o jsonpath='{range .status.conditions[*]}{.type}{ " " }{.status}{ " " }{.message}{ "\n"}{end}'
```

...

DB smoke test logs:

...

```
oc -n db logs job/outbox-smoke-test
```

...

Rerun Sequence

Recommended Jenkins run:

```
- `RUN_ALL=true`
```

```
- `SKIP_BUILD=true`
```

Or manual sequence:

1. Delete jobs if needed
2. Bump `run_id` in GitOps jobs
3. Push GitOps repo
4. Argo auto-sync
5. Verify topics and connector status

Notes

The Argo UI route is:

...

```
https://openshift-gitops-server-openshift-gitops.apps-crc.testing
```

...

Use the `ecomm-db` app to view Jobs in namespace `db`.

Docs Generation

Rendered PDFs are generated into `docs/output`:

```
- `ARCHITECTURE_TROUBLESHOOTING.pdf`
```

```
- `ARCHITECTURE_TROUBLESHOOTING_RENDERED.pdf`
```

To regenerate:

```
```  
cd docs
make render
```
```