

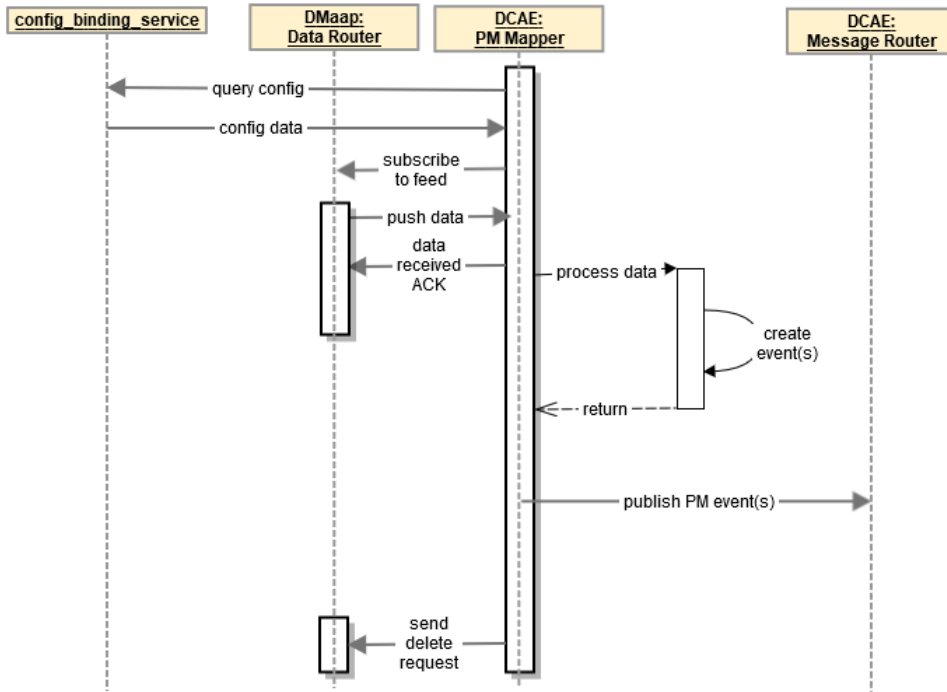
PM-Mapper

3GPP PM Mapper will process 3GPP PM XML files to produce perf3gpp VES PM Events.

The PM-Mapper subscribes at the data-router and gets the XML-files pushed to be processed. If data from file is processed, PM-Mapper sends delete command to data-router, indicating successful operation.

The PM Mapper extracts the measurements from a 3GPP XML file and sends VES-messages to the message-router.

PM Mapper Summary Sequence Diagram



The PM Mapper consumes the 3GPP XML files from DMAap-DR, and processes them. It is possible to process it in parallel. In order to parallel processing, new configuration env has been introduced:

- PROCESSING_LIMIT_RATE (optional, default value: 1) - allows to limit the rate of processing files through channel.
- THREADS_MULTIPLIER (optional, default value: 1) - allows to specify multiplier to calculate the amount of threads.
- PROCESSING_THREADS_COUNT (optional, default value: number of threads available to JVM) - allows to specify number of threads that will be used for files processing.

PM Mapper Filtering

The PM Mapper performs data reduction, by filtering the PM telemetry data it receives. This filtering information is provided to the service as part of its configuration, and is used to identify desired PM measurements (measType) contained within the data. The service can accept an exact match to the measType or regex(java.util.regex) identifying multiple measTypes (it is possible to use both types simultaneously). If a filter is provided, any measurement that does not match the filter, will be ignored and a warning will be logged.

Issues:

- The PM-Mapper is **not scalable because it holds status inside own memory**. No sync with other PODS possible. It has a limited number of working threads.
- The PM mapper **holds these files in memory**. Delivery does not include saving file to file-system.
- **The mapping of unordered linked pair-value items is not covered**. The result is wrong mapped counters with wrong values. This is an accepted bug from C.V. Raman.
- No thread safe implementation of cached files that are in processing status.
- Slow processing on String with template operations.

Questions:

Why do we have differences in templating to onap-community implementation (line 11)?

TNAP

```

<#macro measValuesList measInfo>
[
<#list measInfo.measValue as measValue>
  {
    "measObjInstId": "${measValue.@measObjLdn
[0]!}",
    "suspectFlag": "${measValue.suspect[0]!
>false}",
    "measResults": [
      <#if measValue.r?has_content>
      <#list measValue.r as r>
        {
          "p": ${r?index+1},
          "sValue": "${r}"
        }<#sep>,</#sep>
      </#list>
      <#else>
      <#list measValue.measResults?split(" ") as
r>
        {
          "p":${r?index+1},
          "sValue": "${r}"
        }<#sep>,</#sep>
      </#list>
      </#if>
    ]
  }
<#sep>,</#sep>
</#list>
]
</#macro>

```

ONAP

```

<#macro measValuesList measInfo>
[
<#list measInfo.measValue as measValue>
  {
    "measObjInstId": "${measValue.@measObjLdn
[0]!}",
    "suspectFlag": "${measValue.suspect[0]!
>false}",
    "measResults": [
      <#if measValue.r?has_content>
      <#list measValue.r as r>
        {
          "p": ${r.@p},
          "sValue": "${r}"
        }<#sep>,</#sep>
      </#list>
      <#else>
      <#list measValue.measResults?split(" ") as
r>
        {
          "p":${r?index+1},
          "sValue": "${r}"
        }<#sep>,</#sep>
      </#list>
      </#if>
    ]
  }
<#sep>,</#sep>
</#list>
]
</#macro>

```

Analysis:**BUG1:**

This analysis is done after restart of the system.

When analysing the behavior it helps to take a look on the data-router, what files are delivered to pm-mapper:

```

MariaDB [datarouter]> select count(*) as count, DELIVERY_FILEID from log_records where RESULT='200' group by
DELIVERY_FILEID order by count desc;

```

count	DELIVERY_FILEID
159	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml
158	PM202209261900+020024C20220926.1800+0200-20220926.1900+0200_MRBTS=999965.xml
158	PM202209262000+020024C20220926.1900+0200-20220926.2000+0200_MRBTS=999965.xml
143	PM202209270845+020024C20220927.0830+0200-20220927.0845+0200_MRBTS=515027.xml
142	PM202209270945+020024C20220927.0930+0200-20220927.0945+0200_MRBTS=999965.xml
2	PM202209262245+020024C20220926.2230+0200-20220926.2245+0200_MRBTS=999965.xml
2	PM202209270815+020024C20220927.0800+0200-20220927.0815+0200_MRBTS=999965.xml
...	
2	PM202209270245+020024C20220927.0230+0200-20220927.0245+0200_MRBTS=999965.xml
1	PM202209270230+020024C20220927.0215+0200-20220927.0230+0200_MRBTS=515027.xml
1	PM202209271230+020024C20220927.1215+0200-20220927.1230+0200_MRBTS=999965.xml
1	PM202209261600+020024C20220926.1500+0200-20220926.1600+0200_MRBTS=999965.xml
1	PM202209280030+020024C20220928.0015+0200-20220928.0030+0200_MRBTS=999965.xml
...	

We can see, that the first 5 entries are being retried for several times. Other max. of 2 times and the rest only has one retry. Looking at one unsuccessful and one successful shows:

```
MariaDB [datarouter]> select * from log_records where DELIVERY_FILEID='PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml';
```

TYPE	EVENT_TIME	PUBLISH_ID	FEEDID	REQUIRE	METHOD	CONTENT_TYPE	CONTENT_LENGTH	FEED_FILEID	REMOTE_ADDR	USER	STATUS	DELIVERY_SUBID	DELIVERY_FILEID	ATTEMPTS	REASON	RECORD_ID	CONTENT_LENGTH_2	FILENAME	RESULT	
del	1664264173652	1664264162201.dmaap-dr-node	1	1	http://dcae-pm-mapper:8081/delivery	/PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	PUT	application/octet-stream	68606	NULL	NULL	1	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	200	NULL	NULL	NULL	NULL	NULL	
del	1664264184818	1664264162201.dmaap-dr-node	1	1	http://dcae-pm-mapper:8081/delivery	/PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	PUT	application/octet-stream	68606	NULL	NULL	1	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	429	NULL	NULL	NULL	NULL	NULL	
del	1664264190300	1664264162201.dmaap-dr-node	1	1	http://dcae-pm-mapper:8081/delivery	/PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	PUT	application/octet-stream	68606	NULL	NULL	1	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	200	NULL	NULL	NULL	NULL	NULL	
del	1664264195838	1664264162201.dmaap-dr-node	1	1	http://dcae-pm-mapper:8081/delivery	/PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	PUT	application/octet-stream	68606	NULL	NULL	1	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	429	NULL	NULL	NULL	NULL	NULL	
del	1664264201281	1664264162201.dmaap-dr-node	1	1	http://dcae-pm-mapper:8081/delivery	/PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	PUT	application/octet-stream	68606	NULL	NULL	1	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	200	NULL	NULL	NULL	NULL	NULL	
del	1664264206581	1664264162201.dmaap-dr-node	1	1	http://dcae-pm-mapper:8081/delivery	/PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	PUT	application/octet-stream	68606	NULL	NULL	1	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	200	NULL	NULL	NULL	NULL	NULL	
del	1664264212064	1664264162201.dmaap-dr-node	1	1	http://dcae-pm-mapper:8081/delivery	/PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	PUT	application/octet-stream	68606	NULL	NULL	1	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	200	NULL	NULL	NULL	NULL	NULL	
del	1664264217534	1664264162201.dmaap-dr-node	1	1	http://dcae-pm-mapper:8081/delivery	/PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	PUT	application/octet-stream	68606	NULL	NULL	1	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	200	NULL	NULL	NULL	NULL	NULL	
...																				
del	1664350301756	1664264162201.dmaap-dr-node	1	1	http://dcae-pm-mapper:8081/delivery	/PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	PUT	application/octet-stream	68606	NULL	NULL	1	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	200	NULL	NULL	NULL	NULL	NULL	
exp	1664350906700	1664264162201.dmaap-dr-node	1	1	http://dcae-pm-mapper:8081/delivery	/PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	PUT	application/octet-stream	68606	NULL	NULL	1	PM202209261845+020024C20220926.1830+0200-20220926.1845+0200_MRBTS=999965.xml	NULL	176	retriesExhausted	2019	NULL	NULL	

```

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
MariaDB [datarouter]> select * from log_records where DELIVERY_FILEID='PM202209270230+020024C20220927.0215+0200-
20220927.0230+0200_MRBT5=515027.xml' or FILENAME='PM202209270230+020024C20220927.0215+0200-20220927.0230
+0200_MRBT5=515027.xml.gz';
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| TYPE | EVENT_TIME      | PUBLISH_ID          | FEEDID |
REQUIRE
| METHOD | CONTENT_TYPE     | CONTENT_LENGTH      |
FEED_FILEID                                | REMOTE_ADDR | USER    |
STATUS | DELIVERY_SUBID | DELIVERY_FILEID    | RESULT
| ATTEMPTS | REASON | RECORD_ID | CONTENT_LENGTH_2 |
FILENAME
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| pub  | 1664264310343 | 1664264310341.dmaap-dr-node | 1 | https://dmaap-dr-node/publish/1
/PM202209270230+020024C20220927.0215+0200-20220927.0230+0200_MRBT5=515027.xml.gz | PUT | application/octet-
stream | 31887 | PM202209270230+020024C20220927.0215+0200-20220927.0230+0200_MRBT5=515027.xml.gz |
10.233.82.14 | username | 204 | NULL |
NULL | NULL | NULL | NULL
| 303 | NULL | PM202209270230+020024C20220927.0215+0200-20220927.0230+0200_MRBT5=515027.xml.
gz |
| del  | 1664264883215 | 1664264310341.dmaap-dr-node | 1 | http://dcae-pm-mapper:8081/delivery
/PM202209270230+020024C20220927.0215+0200-20220927.0230+0200_MRBT5=515027.xml | PUT | application/octet-
stream | 31887 | NULL
NULL | username | NULL | 1 | PM202209270230+020024C20220927.0215+0200-20220927.0230
+0200_MRBT5=515027.xml | 200 | NULL | NULL | 393 | NULL |
NULL |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
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+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

```

The unsuccessful made exactly 24h a retry. Always the pm-mapper says, that it is still processing in cache:

```

2022-09-28T06:31:08.232Z    XNIO-1 task-3    INFO    org.onap.dcae-gen2.services.pmmapper.
App        Skipping. This event is already waiting in cache to be processed: 1664264499443.dmaap-dr-
node
2022-09-28T06:31:08.244Z    XNIO-1 task-3    INFO    org.onap.dcae-gen2.services.pmmapper.
App        Skipping. This event is already waiting in cache to be processed: 1664264167025.dmaap-dr-
node
2022-09-28T06:31:08.250Z    XNIO-1 task-3    INFO    org.onap.dcae-gen2.services.pmmapper.
App        Skipping. This event is already waiting in cache to be processed: 1664264583230.dmaap-dr-
node
2022-09-28T06:31:08.254Z    XNIO-1 task-3    INFO    org.onap.dcae-gen2.services.pmmapper.
App        Skipping. This event is already waiting in cache to be processed: 1664264163320.dmaap-dr-
node
2022-09-28T06:31:08.255Z    XNIO-1 task-3    INFO    org.onap.dcae-gen2.services.pmmapper.
App        Skipping. This event is already waiting in cache to be processed: 1664264162201.dmaap-dr-node

```

So, something is not correct in pm-mapper that a file needs > 24h to process. Looking at it a bit deeper shows an implementation failure: In the log we find:

```

2022-09-27T07:36:26.871Z | INFO | Sending DELETE request to https://dmaap-dr-node:8443/delete/1/1664264162201.dmaap-dr-node.
2022-09-27T07:36:26.941Z | INFO | de97c463-1354-4fc3-abae-0cdccc894ff2
2022-09-27T07:36:28.027Z | ERROR | Execution error: Not Found
2022-09-27T07:36:28.037Z | ERROR | Process event failure
2022-09-27T07:36:28.053Z | INFO | Successfully published VES events to messengerouter.

```

This means, that the file was mapped and the result was published to message-router, but the deleting in data-router was not successful. So message-router makes retry and pm-mapper answers that the file is still processing:

```

this.flux.onBackPressed(App::handleBackPressed)
    .doOnNext(App::receiveRequest)
    .filter(event -> !isCached(event.getPublishIdentity()))
    .doOnNext(App::addToCache)
    .limitRate(processingConfig.getLimitRate())
    .parallel(processingThreads)
    .runOn(Schedulers.newParallel("Thread", processingThreads), PREFETCH_ONE_PER_THREAD)
    .doOnNext(event -> MDC.setContextMap(event.getMdc()))
    .filter(this.metadataFilter::filter)
    .filter(event -> App.filterByFileType(this.filterHandler, event, this.mapperConfig))
    .filter(event -> App.validate(this.validator, event, this.mapperConfig))
    .concatMap(event -> App.split(this.splitter, event, this.mapperConfig))
    .filter(events -> App.filter(this.filterHandler, events, this.mapperConfig))
    .concatMap(events -> App.map(this.mapper, events, this.mapperConfig))
    .concatMap(this.vesPublisher::publish)
    .subscribe(event -> App.sendEventProcessed(this.mapperConfig, event));

public static void sendEventProcessed(MapperConfig config, Event event) {
    try {
        DataRouterUtils.processEvent(config, event);
        eventsCache.remove(event.getPublishIdentity());
    } catch (ProcessEventException exception) {
        logger.unwrap().error("Process event failure", exception);
    }
}

```

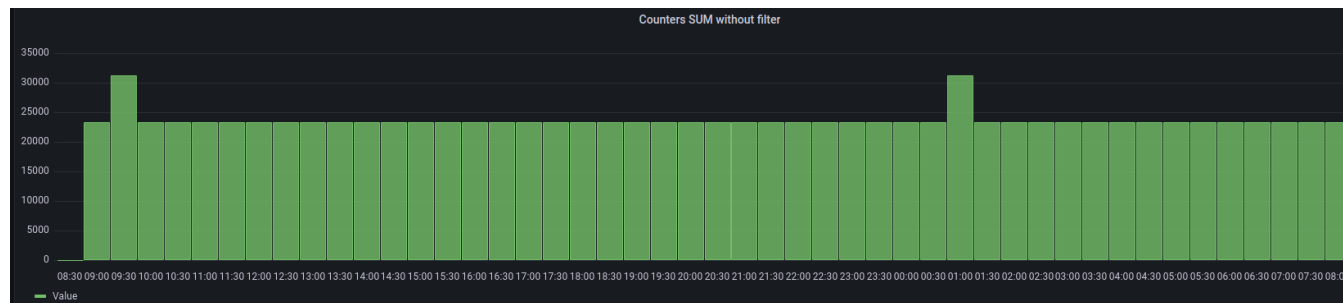
Here is the problem: **When sending the processEvent to data-router it comes to an exception.** The code where file is removed from cache is not reached.

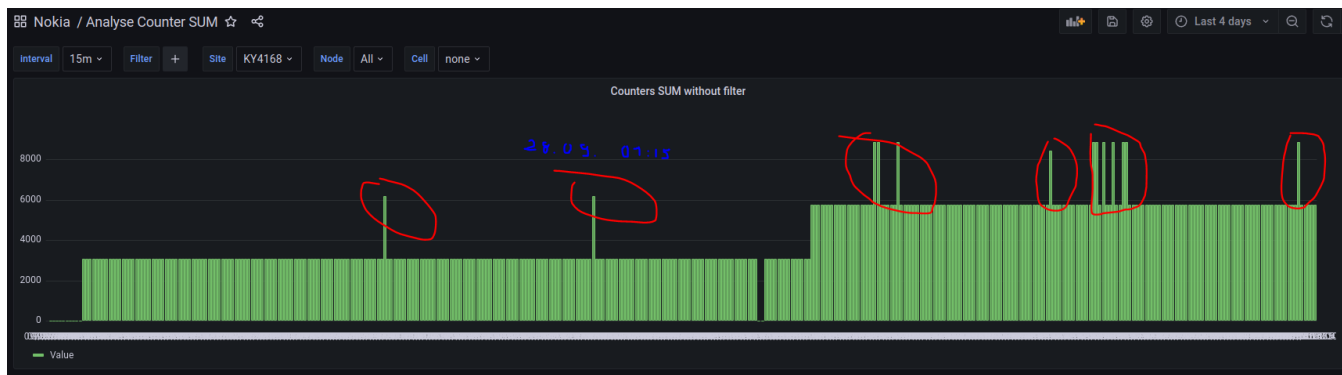
The implementation has to be changed, that there will be a **retry to send the DataRouterUtils.processEvent** until it is processed correctly. Then the file can be removed from cache, because data-router will not push file again.

This should be discussed as a bug with community.

BUG2:

The second problem that was noticed when processing the files is that some **pm data was apparently processed twice**. You can see this in the number of counters, which are exactly twice as many.





This is a problem of the **non-synchronized processing** of the pm data to be mapped.

```

this.flux.onBackPressed(App::handleBackPressed)
    .doOnNext(App::receiveRequest)
    .filter(event -> !isCached(event.getPublishIdentity()))
    .doOnNext(App::addToCache)
    .limitRate(processingConfig.getLimitRate())
    .parallel(processingThreads)
    .runOn(Schedulers.newParallel("Thread", processingThreads), PREFETCH_ONE_PER_THREAD)
    .doOnNext(event -> MDC.setContextMap(event.getMdc()))
    .filter(this.metadataFilter::filter)
    .filter(event -> App.filterByFileType(this.filterHandler, event, this.mapperConfig))
    .filter(event -> App.validate(this.validator, event, this.mapperConfig))
    .concatMap(event -> App.split(this.splitter, event, this.mapperConfig))
    .filter(events -> App.filter(this.filterHandler, events, this.mapperConfig))
    .concatMap(events -> App.map(this.mapper, events, this.mapperConfig))
    .concatMap(this.vesPublisher::publish)
    .subscribe(event -> App.sendEventProcessed(this.mapperConfig, event));

private boolean isCached(String id) {
    boolean isPresent = eventsCache.contains(id);
    if(isPresent) {
        logger.unwrap().info("Skipping. This event is already waiting in cache to be processed: {}", id);
    }
    return isPresent;
}

public static void addToCache(@NonNull Event event) {
    eventsCache.add(event.getPublishIdentity());
}

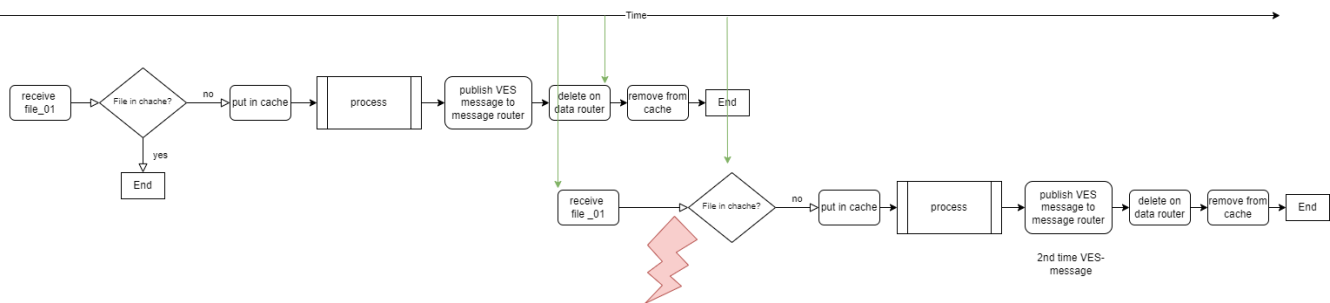
public Flux<Event> publish(List<Event> events) {
    logger.unwrap().info("Publishing VES events to messengerouter.");
    Event first = events.get(0);
    List<String> vesEvents = minifiedVesEvents(events);
    return publishEvents(vesEvents)
        .filter(DmaapResponse::failed)
        .takeLast(1)
        .flatMap(this::toFluxError)
        .defaultIfEmpty(first)
        .doOnComplete(() -> logger.unwrap().info("Successfully published VES events to messengerouter."))
        .onErrorResume(this::resume);
}

public static void sendEventProcessed(MapperConfig config, Event event) {
    try {
        DataRouterUtils.processEvent(config, event);
        eventsCache.remove(event.getPublishIdentity());
    } catch (ProcessEventException exception) {
        logger.unwrap().error("Process event failure", exception);
    }
}

```

Here we have a possible **theoretical gap** between the `sendEventProcessed` <Line 16, 46> and new incoming pushed files `receiveRequest` <Line 2>. The possibility is, that events to message router were pushed and the finalize is done, some milli seconds or seconds before the file is being received, processed in some seconds, and after that the old file (the same) is not in cache any more....

This happend several times.



When looking at data-router, this is what the delivery says for the time-period in which the error occurred:

```
MariaDB [datarouter]> select * from log_records where FEED_FILEID like '%MRBTS=999965.xml%' and FEED_FILEID like '%20220928%' and (FEED_FILEID like '%0100%' or FEED_FILEID like '%0115%' or FEED_FILEID like '%0130%') limit 100;
```

TYPE	EVENT_TIME	PUBLISH_ID	FEEDID	REQUIRE	METHOD	CONTENT_TYPE	CONTENT_LENGTH	FEED_FILEID	REMOTE_ADDR	USER	STATUS	DELIVERY_SUBID	DELIVERY_FILEID	RESULT	ATTEMPTS	REASON	RECORD_ID	CONTENT_LENGTH_2	FILENAME
pub	1664316026872	1664316026863.dmaap-dr-node	1		https://dmaap-dr-node/publish/1/PM202209280100+020024C20220928.0000+0200-20220928.0100+0200_MRBTS=999965.xml.gz	PUT	application/octet-stream	68592	10.233.82.14	username	204	204	PM202209280100+020024C20220928.0000+0200-20220928.0100+0200_MRBTS=999965.xml.gz	NULL	NULL	NULL	NULL	NULL	1559
pub	1664316931110	1664316931105.dmaap-dr-node	1		https://dmaap-dr-node/publish/1/PM202209280115+020024C20220928.0100+0200-20220928.0115+0200_MRBTS=999965.xml.gz	PUT	application/octet-stream	68808	10.233.82.14	username	204	204	PM202209280115+020024C20220928.0100+0200-20220928.0115+0200_MRBTS=999965.xml.gz	NULL	NULL	NULL	NULL	NULL	1561
pub	1664317826248	1664317826240.dmaap-dr-node	1		https://dmaap-dr-node/publish/1/PM202209280130+020024C20220928.0115+0200-20220928.0130+0200_MRBTS=999965.xml.gz	PUT	application/octet-stream	68612	10.233.82.14	username	204	204	PM202209280130+020024C20220928.0115+0200-20220928.0130+0200_MRBTS=999965.xml.gz	NULL	NULL	NULL	NULL	NULL	1589
pub	1664318730484	1664318730477.dmaap-dr-node	1		https://dmaap-dr-node/publish/1/PM202209280145+020024C20220928.0130+0200-20220928.0145+0200_MRBTS=999965.xml.gz	PUT	application/octet-stream	68839	10.233.82.14	username	204	204	PM202209280145+020024C20220928.0130+0200-20220928.0145+0200_MRBTS=999965.xml.gz	NULL	NULL	NULL	NULL	NULL	1591
pub	1664319626654	1664319626647.dmaap-dr-node	1		https://dmaap-dr-node/publish/1/PM202209280200+020024C20220928.0100+0200-20220928.0200+0200_MRBTS=999965.xml.gz	PUT	application/octet-stream	68597	10.233.82.14	username	204	204	PM202209280200+020024C20220928.0100+0200-20220928.0200+0200_MRBTS=999965.xml.gz	NULL	NULL	NULL	NULL	NULL	1612

5 rows in set (0.072 sec)

```
MariaDB [datarouter]> select * from log_records where PUBLISH_ID='1664316026863.dmaap-dr-node' or PUBLISH_ID='1664316931105.dmaap-dr-node' or PUBLISH_ID='1664319626647.dmaap-dr-node' or PUBLISH_ID='1664317826240.dmaap-dr-node' or PUBLISH_ID='1664318730477.dmaap-dr-node' order by PUBLISH_ID, EVENT_TIME limit 100;
```



```

+-----+
| TYPE | EVENT_TIME | PUBLISH_ID | FEEDID |
REQUIR
| METHOD | CONTENT_TYPE | CONTENT_LENGTH |
FEED_FILEID | REMOTE_ADDR | USER |
STATUS | DELIVERY_SUBID | DELIVERY_FILEID | RESULT
| ATTEMPTS | REASON | RECORD_ID | CONTENT_LENGTH_2 |
FILENAME |
+-----+
+-----+
+-----+
+-----+
+-----+
+-----+
+-----+
| pub | 1664316026872 | 1664316026863.dmaap-dr-node | 1 | https://dmaap-dr-node/publish/1
/PM202209280100+020024C20220928.0000+0200-20220928.0100+0200_MRBT=999965.xml.gz | PUT | application/octet-
stream | 68592 | PM202209280100+020024C20220928.0000+0200-20220928.0100+0200_MRBT=999965.xml.gz |
10.233.82.14 | username | 204 | NULL |
NULL | NULL | NULL | NULL |
| 1559 | NULL | PM202209280100+020024C20220928.0000+0200-20220928.0100+0200_MRBT=999965.xml.
gz |
| del | 1664317003596 | 1664316026863.dmaap-dr-node | 1 | http://dcae-pm-mapper:8081/delivery
/PM202209280100+020024C20220928.0000+0200-20220928.0100+0200_MRBT=999965.xml | PUT | application/octet-
stream | 68592 | NULL |
NULL | username | NULL | 1 | PM202209280100+020024C20220928.0000+0200-20220928.0100
+0200_MRBT=999965.xml | 200 | NULL | NULL | 1569 | NULL |
NULL |
| del | 1664317009094 | 1664316026863.dmaap-dr-node | 1 | http://dcae-pm-mapper:8081/delivery
/PM202209280100+020024C20220928.0000+0200-20220928.0100+0200_MRBT=999965.xml | PUT | application/octet-
stream | 68592 | NULL |
NULL | username | NULL | 1 | PM202209280100+020024C20220928.0000+0200-20220928.0100
+0200_MRBT=999965.xml | 200 | NULL | NULL | 1576 | NULL |
NULL |
| pub | 1664316931110 | 1664316931105.dmaap-dr-node | 1 | https://dmaap-dr-node/publish/1
/PM202209280115+020024C20220928.0100+0200-20220928.0115+0200_MRBT=999965.xml.gz | PUT | application/octet-
stream | 68808 | PM202209280115+020024C20220928.0100+0200-20220928.0115+0200_MRBT=999965.xml.gz |
10.233.82.14 | username | 204 | NULL |
NULL | NULL | NULL | NULL |
| 1561 | NULL | PM202209280115+020024C20220928.0100+0200-20220928.0115+0200_MRBT=999965.xml.
gz |
| del | 1664317003580 | 1664316931105.dmaap-dr-node | 1 | http://dcae-pm-mapper:8081/delivery
/PM202209280115+020024C20220928.0100+0200-20220928.0115+0200_MRBT=999965.xml | PUT | application/octet-
stream | 68808 | NULL |
NULL | username | NULL | 1 | PM202209280115+020024C20220928.0100+0200-20220928.0115
+0200_MRBT=999965.xml | 200 | NULL | NULL | 1567 | NULL |
NULL |
| del | 1664317009088 | 1664316931105.dmaap-dr-node | 1 | http://dcae-pm-mapper:8081/delivery
/PM202209280115+020024C20220928.0100+0200-20220928.0115+0200_MRBT=999965.xml | PUT | application/octet-
stream | 68808 | NULL |
NULL | username | NULL | 1 | PM202209280115+020024C20220928.0100+0200-20220928.0115
+0200_MRBT=999965.xml | 200 | NULL | NULL | 1573 | NULL |
NULL |
| pub | 1664317826248 | 1664317826240.dmaap-dr-node | 1 | https://dmaap-dr-node/publish/1
/PM202209280130+020024C20220928.0115+0200-20220928.0130+0200_MRBT=999965.xml.gz | PUT | application/octet-
stream | 68612 | PM202209280130+020024C20220928.0115+0200-20220928.0130+0200_MRBT=999965.xml.gz |
10.233.82.14 | username | 204 | NULL |
NULL | NULL | NULL | NULL |
| 1589 | NULL | PM202209280130+020024C20220928.0115+0200-20220928.0130+0200_MRBT=999965.xml.
gz |
| del | 1664318824081 | 1664317826240.dmaap-dr-node | 1 | http://dcae-pm-mapper:8081/delivery
/PM202209280130+020024C20220928.0115+0200-20220928.0130+0200_MRBT=999965.xml | PUT | application/octet-
stream | 68612 | NULL |
NULL | username | NULL | 1 | PM202209280130+020024C20220928.0115+0200-20220928.0130
+0200_MRBT=999965.xml | 200 | NULL | NULL | 1600 | NULL |
NULL |
| pub | 1664318730484 | 1664318730477.dmaap-dr-node | 1 | https://dmaap-dr-node/publish/1
/PM202209280145+020024C20220928.0130+0200-20220928.0145+0200_MRBT=999965.xml.gz | PUT | application/octet-
stream | 68839 | PM202209280145+020024C20220928.0130+0200-20220928.0145+0200_MRBT=999965.xml.gz |
10.233.82.14 | username | 204 | NULL |
NULL | NULL | NULL | NULL |

```

```

| 1591 | NULL | PM202209280145+020024C20220928.0130+0200-20220928.0145+0200_MRBTS=999965.xml.gz |
| del | 1664318824078 | 1664318730477.dmaap-dr-node | 1 | http://dcae-pm-mapper:8081/delivery/PM202209280145+020024C20220928.0130+0200-20220928.0145+0200_MRBTS=999965.xml | PUT | application/octet-stream | 68839 | NULL |
NULL | username | NULL | 1 | PM202209280145+020024C20220928.0130+0200-20220928.0145+0200_MRBTS=999965.xml | 200 | NULL | NULL | 1598 | NULL |
NULL |
| pub | 1664319626654 | 1664319626647.dmaap-dr-node | 1 | https://dmaap-dr-node/publish/1/PM202209280200+020024C20220928.0100+0200-20220928.0200+0200_MRBTS=999965.xml.gz | PUT | application/octet-stream | 68597 | PM202209280200+020024C20220928.0100+0200-20220928.0200+0200_MRBTS=999965.xml.gz | 10.233.82.14 | username | 204 | NULL |
NULL | NULL | NULL | NULL |
| 1612 | NULL | PM202209280200+020024C20220928.0100+0200-20220928.0200+0200_MRBTS=999965.xml.gz |
| del | 1664320639127 | 1664319626647.dmaap-dr-node | 1 | http://dcae-pm-mapper:8081/delivery/PM202209280200+020024C20220928.0100+0200-20220928.0200+0200_MRBTS=999965.xml | PUT | application/octet-stream | 68597 | NULL |
NULL | username | NULL | 1 | PM202209280200+020024C20220928.0100+0200-20220928.0200+0200_MRBTS=999965.xml | 200 | NULL | NULL | 1620 | NULL |
NULL |
| del | 1664320644628 | 1664319626647.dmaap-dr-node | 1 | http://dcae-pm-mapper:8081/delivery/PM202209280200+020024C20220928.0100+0200-20220928.0200+0200_MRBTS=999965.xml | PUT | application/octet-stream | 68597 | NULL |
NULL | username | NULL | 1 | PM202209280200+020024C20220928.0100+0200-20220928.0200+0200_MRBTS=999965.xml | 200 | NULL | NULL | 1631 | NULL |
NULL |
+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+
13 rows in set (0.134 sec)

```

For all of these deliveries the answer of the pm-mapper is:

```

2022-09-27T23:17:21.870Z | INFO | Skipping. This event is already waiting in cache to be processed:
1664319626647.dmaap-dr-node
...
2022-09-27T23:17:22.023Z | INFO | Publishing VES events to messengerouter.
2022-09-27T23:17:22.112Z | INFO | Sending processed to DataRouter
2022-09-27T23:17:22.113Z | INFO | d53218c8-91c5-4560-8f3c-c09a71569b78
2022-09-27T23:17:22.113Z | INFO | Sending DELETE request to https://dmaap-dr-node:8443/delete/1/1664319626647.dmaap-dr-node.
2022-09-27T23:17:22.131Z | INFO | Response code: 200, Server Response Received:\n
2022-09-27T23:17:22.131Z | INFO | Successfully published VES events to messengerouter.

```

Except for 1664316931105.dmaap-dr-node

There the log is:

```
2022-09-27T22:16:46.325Z | INFO | Publishing VES events to messengerouter.
2022-09-27T22:16:46.351Z | INFO | Sending processed to DataRouter
2022-09-27T22:16:46.352Z | INFO | ce06bd30-7e90-47a1-a8a8-c05be8f5d093
2022-09-27T22:16:46.352Z | INFO | Sending DELETE request to https://dmaap-dr-node:8443/delete/1/1664316931105.
dmaap-dr-node.
2022-09-27T22:16:46.401Z | INFO | Response code: 200, Server Response Received:\n
2022-09-27T22:16:46.401Z | INFO | Successfully published VES events to messengerouter.
...
2022-09-27T22:16:51.239Z | INFO | Publishing VES events to messengerouter.
2022-09-27T22:16:51.299Z | INFO | Sending processed to DataRouter
2022-09-27T22:16:51.299Z | INFO | b6b576cb-0534-467c-9c80-b5baccace8de
2022-09-27T22:16:51.300Z | INFO | Sending DELETE request to https://dmaap-dr-node:8443/delete/1/1664316931105.
dmaap-dr-node.
2022-09-27T22:16:51.320Z | INFO | Response code: 200, Server Response Received:\n
2022-09-27T22:16:51.320Z | INFO | Successfully published VES events to messengerouter.
```

Meaning, that the pm-mapper accepted the file twice. This is resulting of above described not synchron threading problem.

Workaroud here possible: When looking at first retry times from data-router (2022 00:16:43.580, 2022 00:16:49.088) shows that this is about 5s. Increasing this to 60s would help to prevent simultaneity.

```
private static final Duration DATA_ROUTER_INITIAL_RETRY_TIMEOUT = Duration.ofSeconds(2); // change to 20
private static final Duration FILE_TRANSFER_INITIAL_RETRY_TIMEOUT = Duration.ofSeconds(5); // change to 30
```

BUG3:

The mapping of the counter and value pairs does not work for **unordered lists**.

```

# Working
<measData>
  <measEntity swVersion="SBTS22R1_ENB_0000_000057_000000"/>
  <measInfo measInfoId="NX2CB">
    <granPeriod duration="PT900S" endTime="2021-09-22T07:30:00+03:00"/>
    <measType p="1">VS.NX2CB.X2_SHUTDOWN_NO_TRAFFIC</measType>
    <measType p="2">VS.NX2CB.X2_SHUTDOWN_DETECTED</measType>
    <measType p="30">VS.NX2CB.ENDC_X2_SETUP_REQUEST_RECEIVED</measType>
    <measValue measObjLdn="PLMN=PLMN,MRBTS=50328,NRBTS=50328">
      <r p="1">1</r>
      <r p="2">2</r>
      <r p="30">3</r>
    </measValue>
  </measInfo>
</measData>

Result:
- VS.NX2CB.X2_SHUTDOWN_NO_TRAFFIC=1
- VS.NX2CB.X2_SHUTDOWN_DETECTED=2
- VS.NX2CB.ENDC_X2_SETUP_REQUEST_RECEIVED=3

# Not working
<measData>
  <measEntity swVersion="SBTS22R1_ENB_0000_000057_000000"/>
  <measInfo measInfoId="NX2CB">
    <granPeriod duration="PT900S" endTime="2021-09-22T07:30:00+03:00"/>
    <measType p="1">VS.NX2CB.X2_SHUTDOWN_NO_TRAFFIC</measType>
    <measType p="2">VS.NX2CB.X2_SHUTDOWN_DETECTED</measType>
    <measType p="30">VS.NX2CB.ENDC_X2_SETUP_REQUEST_RECEIVED</measType>
    <measValue measObjLdn="PLMN=PLMN,MRBTS=50328,NRBTS=50328">
      <r p="30">3</r>
      <r p="2">2</r>
      <r p="1">1</r>
    </measValue>
  </measInfo>
</measData>

Result:
- VS.NX2CB.X2_SHUTDOWN_NO_TRAFFIC=3 (should be 1)
- VS.NX2CB.X2_SHUTDOWN_DETECTED=2
- VS.NX2CB.ENDC_X2_SETUP_REQUEST_RECEIVED=1 (should be 3)

```

From spec:

measResults	XML element measData:measInfo: measValue: measResults or, when the positioning option is used, measData:measInfo: measValue:r	Depending on sender's choice for optional positioning , either XML element "measResults" or XML elements "r" is used.
There is no corresponding File Content Item.	XML element measType XML attribute p	Only for the positioning option: XML attribute "p" of XML element "measType", used to link the performance metric type specified in "measType" to the result value. Its value is a positive integer (excl. zero) and shall be unique for each instance of "measType" in a file.
There is no corresponding File Content Item.	XML element r XML attribute p	Only for the positioning option: XML attribute "p" of the XML element "r", used to link the result value in "r" to its performance metric type in "measType". The value of "p" shall match the value of the XML attribute "p" in the corresponding XML element "measType".

BUG4:

The **PM-Mapper** produces invalid **VES-perf3gpp** messages. The mapping from counter to value is not valid:

The mapping is a list from 1..number of counters.

```
{
  "event": {
    "commonEventHeader": {
      "domain": "perf3gpp",
      "eventId": "b4948c70-41fa-4ae3-a235-72951809167b",
      "sequence": 0,
      "eventName": "perf3gpp_mrbts-Nokia_pmMeasResult",
      "sourceName": "TNOK2",
      "nfVendorName": "Nokia",
      "reportingEntityName": "",
      "priority": "Normal",
      "startEpochMicrosec": 1665737460000000,
      "lastEpochMicrosec": 1665738360000000,
      "version": "4.0",
      "vesEventListenerVersion": "7.1",
      "timeZoneOffset": "UTC+02:00"
    },
    "perf3gppFields": {
      "perf3gppFieldsVersion": "1.0",
      "measDataCollection": {
        "granularityPeriod": 900,
        "measuredEntityUserName": "",
        "measuredEntityDn": "",
        "measuredEntitySoftwareVersion": "SBTS22R3_ENB_0000_001046_000000",
        "measInfoList": [
          {
            "measInfoId": {
              "sMeasInfoId": "NE1CN"
            },
            "measTypes": {
              "sMeasTypesList": [
                "VS.NE1CN.NE1CN_CTXT_MOD_REQ_SENT",
                "VS.NE1CN.NE1CN_CTXT_MOD_RSP_REC'D",
                "VS.NE1CN.NE1CN_CTXT_SETUP_FAIL_REC'D",
                "VS.NE1CN.NE1CN_CTXT_MOD_FAIL_REC'D",
                "VS.NE1CN.NE1CN_CTXT_REL_CMD_SENT",
                "VS.NE1CN.NE1CN_CTXT_REL_CMP_REC'D",
                "VS.NE1CN.NE1CN_CTXT_SETUP_REQ_SENT",
                "VS.NE1CN.NE1CN_CTXT_SETUP_RSP_REC'D"
              ]
            },
            "measValuesList": [
              {
                "measObjInstId": "PLMN=PLMN,MRBTS=2,NRBTS=2",
                "suspectFlag": "false",
                "measResults": [
                  {
                    "p": 2, # should be 1
                    "sValue": "0"
                  },
                  {
                    "p": 3, # should be 2
                    "sValue": "0"
                  },
                  {
                    "p": 4, # should be 3
                    "sValue": "0"
                  },
                  {
                    "p": 5, # should be 4
                    "sValue": "0"
                  },
                  {
                    "p": 12, # should be 5
                    "sValue": "0"
                  }
                ]
              }
            ]
          }
        ]
      }
    }
  }
}
```

```
    {
      "p": 13,          # should be 6
      "sValue": "0"
    },
    {
      "p": 14,          # should be 7
      "sValue": "0"
    },
    {
      "p": 15,          # should be 8
      "sValue": "0"
    }
  ]
}
}
```

Other possible improvements (discuss):

Increasing PROCESSING_THREADS_COUNT and PROCESSING_LIMIT_RATE. Not sure if increasing threads will give more pm-mapper power, since it is processed on one single node. Cache implementation has to be synchronized.

- PROCESSING_THREADS_COUNT = 10
- PROCESSING_LIMIT_RATE = 3.