

แบบฝึกปฏิบัติ ครั้งที่ 9

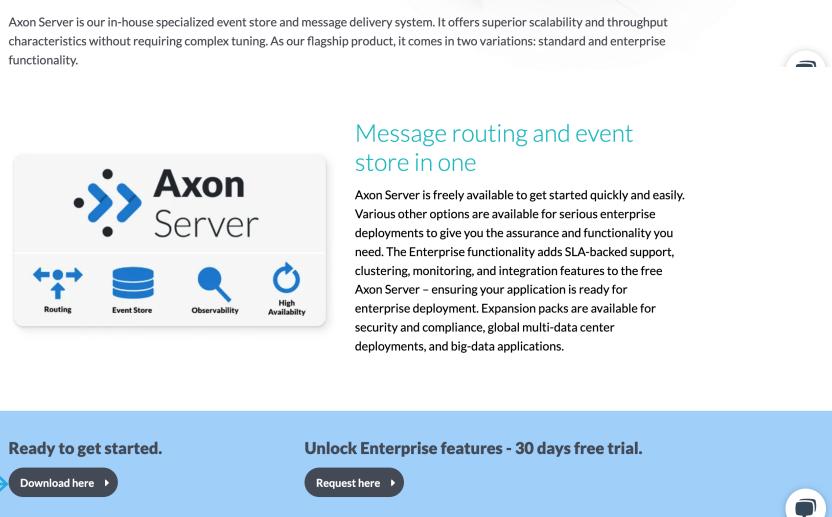
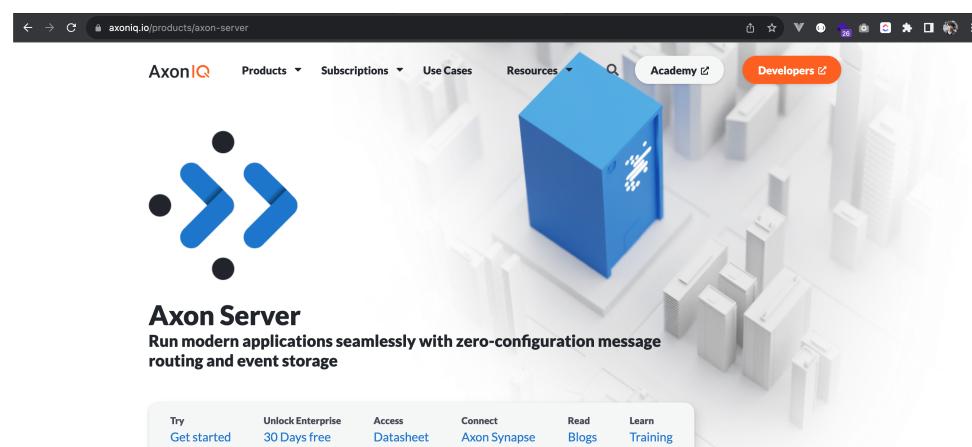
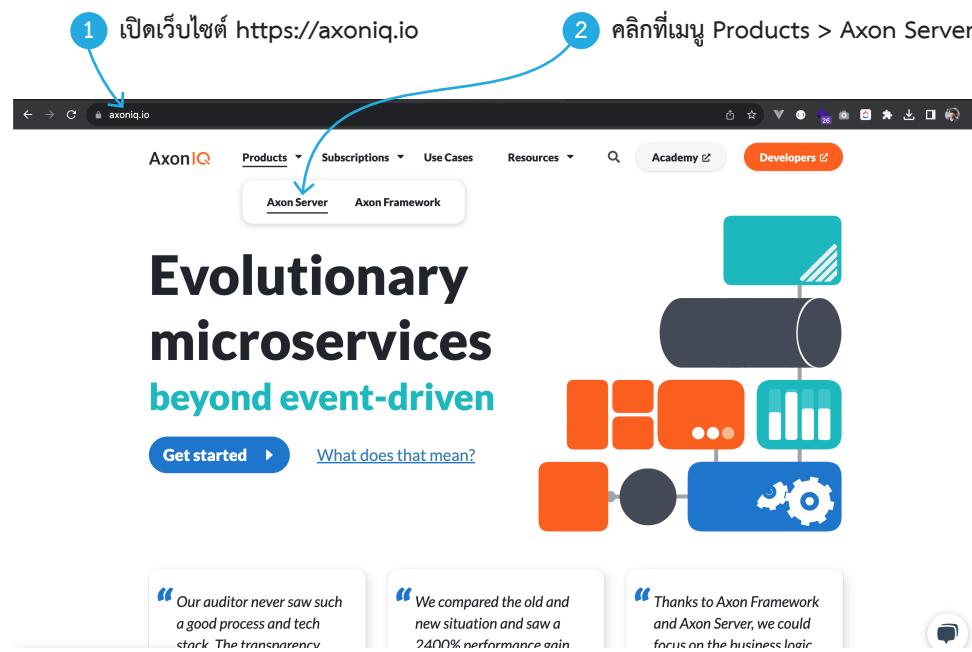
โดย ผศ.ดร.ธราภิเชษฐ์ อิจิจูรูญโรจน์ และ อาจารย์สัญชัย น้อยจันทร์ วิชา 06016325 การโปรแกรมเชิงบริการ

เรื่อง
วัตถุประสงค์

Event-Driven Microservices และ Event Sourcing

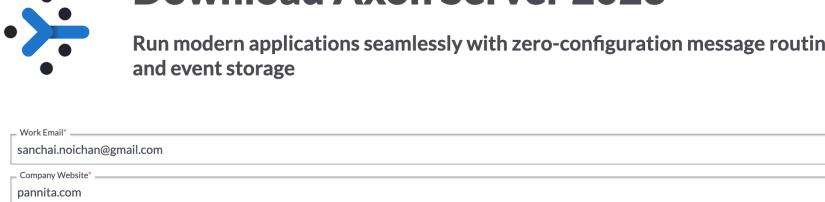
1. เพื่อฝึกฝนการสร้าง microservices แบบ event-driven ด้วยหลักการ event sourcing

ข้อที่ 1 : ติดตั้ง Axon Server



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4 กรอก Work Email และ Company Website ลงไป



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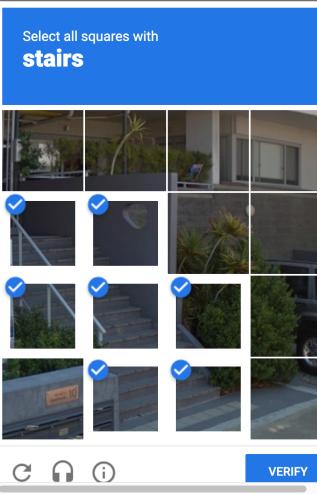
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Thank you!

Thanks for your interest in Axon Server.

Download here:
<https://download.axoniq.io/axonserver/AxonServer.zip>

Or visit:
[Axon Server on Docker Hub](#) for a list of available images

The download file is a zip archive containing multiple jars. On Windows Defender Anti-Virus systems, the post-download security scan may take a very long time. This can look like the download has crashed.

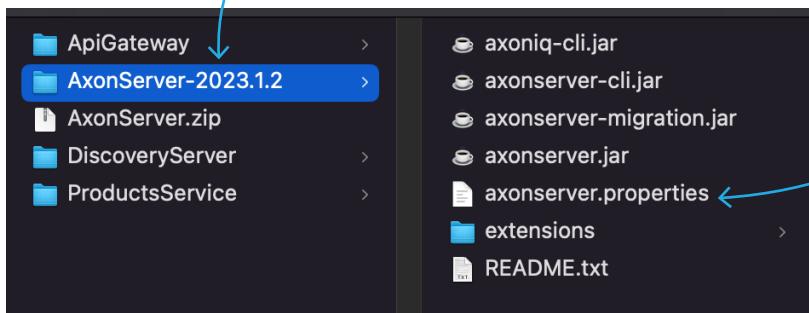
Solutions:

- Wait until completed;
- Temporarily disable Defender Anti-Virus;
- Copy the link and download without a browser, e.g., using wget.

Contact support@axoniq.io if you have any questions.



8 unzip ไฟล์อุกมา จะได้โฟลเดอร์ AxonServer-2023.1.2



9 สร้างไฟล์ใหม่ชื่อ axonserver.properties ในโฟลเดอร์ AxonServer-2023.1.2

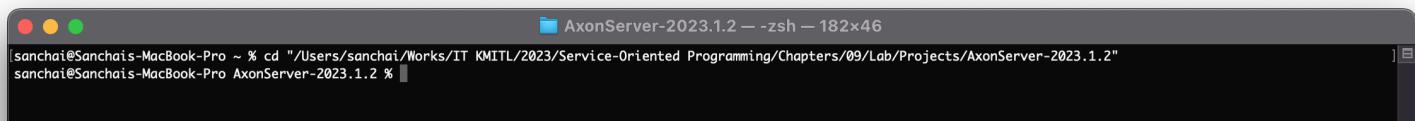
10 เขียนโค้ดตามภาพ สำหรับ configuration ดัวอื่น ๆ ถ้าสนใจ สามารถดูรายละเอียดได้ที่

<https://docs.axoniq.io/reference-guide/axon-server/administration/admin-configuration/configuration#configuration-properties>

```
axonserver.properties
Users > sanchai > Works > IT KMITL > 2023 > Service-O
1 server.port=8025
2 axoniq.axonserver.name=My Axon Server
3 axoniq.axonserver.hostname=localhost
4 axoniq.axonserver.devmode.enabled=true
```

11 เปิด Terminal (สำหรับ MacOS และ Linux) หรือ Command Prompt (สำหรับ Windows) จากนั้นพิมพ์คำสั่งดังนี้ แล้วกดปุ่ม Enter

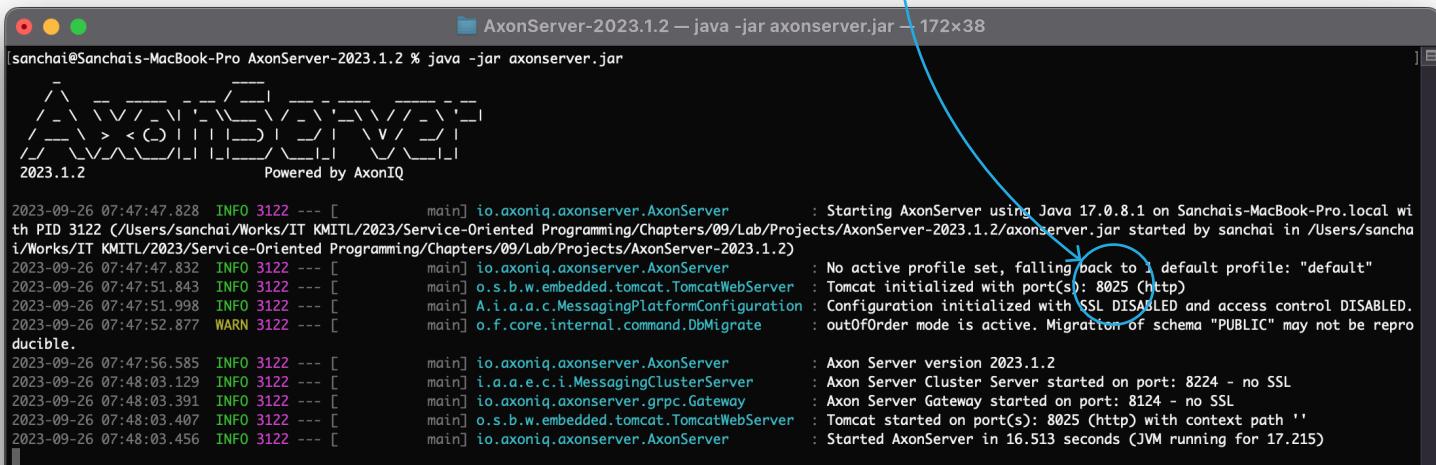
```
cd "path ของโฟลเดอร์ AxonServer-2023.1.2"
```



12 start axon server ด้วยคำสั่ง

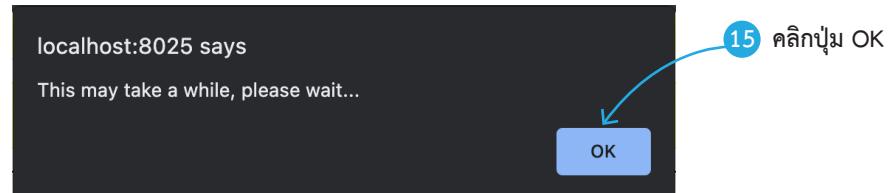
```
java -jar axonserver.jar
```

13 AxonDashboard ลูกรันบน localhost ที่ port 8025



14 เปิด <http://localhost:8025> บน web browser

The screenshot shows the Axon Server setup interface. At the top, it says "SSL disabled", "Development Mode is enabled", and "Authentication disabled". A message states: "It appears that you have a fresh installation. How would you like to initialize this node?". Below this, there's a dropdown for "Action" set to "Start as standalone node or first node" and a text input for "With context name" containing "default". A "Finish" button is at the bottom. On the left, a sidebar has "Settings" selected. Below the main area, there are three tabs: Configuration, Status, and License. The Configuration tab shows node details: Node Name (My Axon Server), Host Name (localhost.local), Http Port (8025), and GRPC Port (8124). The Status tab shows the last event token and a red "Reset Event Store" button. The License tab shows Standard Edition and a link to "Try Enterprise for free".



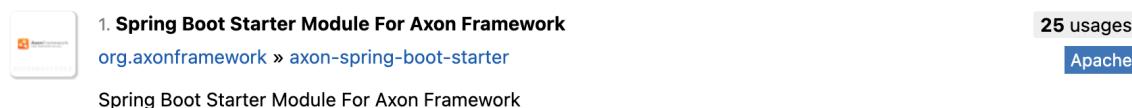
16 ล็อกอินเข้าสู่ระบบ

17 ดำเนินการคลิกปุ่ม OK ที่ตัวอย่าง

The screenshot shows the Axon Server dashboard. The sidebar has "Commands" selected. The main area has three yellow boxes: "SSL disabled", "Development Mode is enabled", and "Authentication disabled". Below this is the Configuration section with the same node details as before. The Status section now includes a "Last event token" field with "-1" and a red "Reset Event Store" button. The License section remains the same. At the bottom, there's a "Activity in the last minute" table and a "Upload license" section with a "Choose File" button and an "Upload" button. A blue arrow from step 16 points to the "Commands" icon in the sidebar. Another blue arrow from step 17 points to the "OK" button in the modal dialog.

ข้อที่ 2 : ทำ Event Sourcing ด้วย Axon Server

- 1 เปิดโปรเจกต์ ProductService ขึ้นมา
- 2 ติดตั้ง dependency ชื่อ Spring Boot Starter Module For Axon Framework (สามารถค้นหาด้วยคำว่า axon-spring-boot-starter) และ Guava: Google Core Libraries For Java (สามารถค้นหาด้วยคำว่า guava)



- 3 สร้าง CreateProductRestModel แล้วเขียนโค้ดตามภาพ

```
package com.sop.productsservice.rest;  
import lombok.Data;  
import java.math.BigDecimal;  
no usages  
@Data  
public class CreateProductRestModel {  
    private String title;  
    private BigDecimal price;  
    private Integer quantity;  
}
```

- 4 สร้าง CreateProductCommand แล้วเขียนโค้ดตามภาพ

```
package com.sop.productsservice.command;  
import lombok.Builder;  
import lombok.Data;  
import org.axonframework.modelling.command.TargetAggregateIdentifier;  
import java.math.BigDecimal;  
no usages  
@Builder  
@Data  
public class CreateProductCommand {  
    @TargetAggregateIdentifier  
    private final String productId;  
    private final String title;  
    private final BigDecimal price;  
    private final Integer quantity;  
}
```

5 เขียนโค้ดเพิ่มใน ProductsController ตามภาพ

The screenshot shows the IntelliJ IDEA interface with the code editor open to the `ProductsController.java` file. The code implements a REST controller for products, handling POST, GET, PUT, and DELETE requests. The `createProduct` method generates a new product command with a random UUID and sends it to the command gateway. The `getProduct`, `updateProduct`, and `deleteProduct` methods return simple HTTP status messages.

```
1 package com.sop.productsservice.rest;
2
3 import com.sop.productsservice.command.CreateProductCommand;
4 import org.axonframework.commandhandling.gateway.CommandGateway;
5 import org.springframework.beans.factory.annotation.Autowired;
6 import org.springframework.core.env.Environment;
7 import org.springframework.web.bind.annotation.*;
8
9 import java.util.UUID;
10
11 @RestController
12 @RequestMapping("/products")
13 public class ProductsController {
14
15     private final Environment env;
16
17     private final CommandGateway commandGateway;
18
19     @Autowired
20     public ProductsController(Environment env, CommandGateway commandGateway) {
21         this.env = env;
22         this.commandGateway = commandGateway;
23     }
24
25     @PostMapping
26     public String createProduct(@RequestBody CreateProductRestModel model) {
27         CreateProductCommand command = CreateProductCommand.builder()
28             .productId(UUID.randomUUID().toString())
29             .title(model.getTitle())
30             .price(model.getPrice())
31             .quantity(model.getQuantity())
32             .build();
33
34         String result;
35         try {
36             result = commandGateway.sendAndWait(command);
37         } catch (Exception e) {
38             result = e.getLocalizedMessage();
39         }
40
41         return result;
42     }
43
44     @GetMapping
45     public String getProduct() { return "HTTP GET Handled " + env.getProperty("local.server.port"); }
46
47     @PutMapping
48     public String updateProduct() { return "HTTP PUT Handled"; }
49
50     @DeleteMapping
51     public String deleteProduct() { return "HTTP DELETE Handled"; }
52
53 }
```

5 สร้าง ProductCreatedEvent และเขียนโค้ดตามภาพ

The screenshot shows the IntelliJ IDEA interface with the code editor open to the `ProductCreatedEvent.java` file. This is a simple data class annotated with `@Data` from Lombok, containing fields for product ID, title, price, and quantity.

```
1 package com.sop.productsservice.event;
2
3 import lombok.Data;
4
5 import java.math.BigDecimal;
6
7 @Data
8 public class ProductCreatedEvent {
9     private String productId;
10    private String title;
11    private BigDecimal price;
12    private Integer quantity;
13}
```

9 สร้าง ProductAggregate และเปลี่ยนโค้ดตามภาพ

The screenshot shows the IntelliJ IDEA interface with the code editor open to `ProductAggregate.java`. The code implements an Axon Aggregate for a product. It includes imports for various Axon and Spring Framework classes, a constructor, a command handler for creating products, and an event handler for product creation events. The code uses Java annotations like `@Aggregate`, `@CommandHandler`, and `@EventSourcingHandler`. The code editor has syntax highlighting and code completion features visible.

```
1 package com.sop.productsservice.command;
2
3 import com.sop.productsservice.event.ProductCreatedEvent;
4 import org.axonframework.commandhandling.CommandHandler;
5 import org.axonframework.eventsourcing.EventSourcingHandler;
6 import org.axonframework.modelling.command.AggregateIdentifier;
7 import org.axonframework.modelling.command.AggregateLifecycle;
8 import org.axonframework.spring.stereotype.Aggregate;
9 import org.springframework.beans.BeanUtils;
10
11 import java.math.BigDecimal;
12
13 @Aggregate
14 public class ProductAggregate {
15     @usage
16     @AggregateIdentifier
17     private String productId;
18     @usage
19     private String title;
20     @usage
21     private BigDecimal price;
22     @usage
23     private Integer quantity;
24
25     public ProductAggregate() {
26     }
27
28     @CommandHandler
29     public ProductAggregate(CreateProductCommand createProductCommand) {
30
31         if (createProductCommand.getPrice().compareTo(BigDecimal.ZERO) <= 0) {
32             throw new IllegalArgumentException("Price cannot be less than or equal to zero");
33         }
34
35         if (createProductCommand.getTitle() == null || createProductCommand.getTitle().isBlank()) {
36             throw new IllegalArgumentException("Title cannot be empty");
37         }
38
39         ProductCreatedEvent productCreatedEvent = new ProductCreatedEvent();
40         BeanUtils.copyProperties(createProductCommand, productCreatedEvent);
41         AggregateLifecycle.apply(productCreatedEvent);
42
43     }
44
45     no usages
46     @EventSourcingHandler
47     public void on(ProductCreatedEvent productCreatedEvent) {
48         System.out.println("ON AGGREGATE");
49         this.productId = productCreatedEvent.getProductId();
50         this.title = productCreatedEvent.getTitle();
51         this.price = productCreatedEvent.getPrice();
52         this.quantity = productCreatedEvent.getQuantity();
53     }
54 }
```

10 Run project (อย่าลืม run project ที่เกี่ยวข้องอื่น ๆ ด้วย)

11 ลองเรียก create product service แล้วดูผลลัพธ์

The screenshot shows a Postman collection named "Microservices / Products / Create Product". A POST request is being made to `http://localhost:8082/product-service/products`. The "Body" tab is selected, showing a JSON payload:

```
1 {
2     "title": "iPhone 14 Pro Max (128GB, Gold)",
3     "price": 39000,
4     "quantity": 10
5 }
```

The response status is 200 OK, and the ID of the created product is displayed as `2b617358-8d1c-4366-82e0-108b9881da39`.

12 Refresh AxonDashboard

13 คลิกเมนู Search

14 ค้นหาด้วยคำว่า aggregateIdentifier="UUID ที่ respond จาก web service"

15 Search

The screenshot shows the Axon Server dashboard with the following details:

- Search Bar:** The search bar at the top has the query "aggregateIdentifier='2b617358-8d1c-4366-82e0-108b9881da39'".
- Table Headers:** The table columns include eventIdentifier, aggregateIdentifier, aggregateSequenceNumber, aggregateType, payloadType, payloadData, timestamp, and metaData.
- Table Data:** One row is shown: 2e348f25-12... 2b617358-8d... 0 ProductAggregate com.sop.productsservice.event.ProductCreatedEvent <com.sop.productsservice.event.ProductCreatedEvent> 2023-09-26... {traceId=9... .
- Page Controls:** Rows per page dropdown set to 10, showing 1-1 of 1.

16 คลิกเพื่อดูรายละเอียด

The screenshot shows the Axon Server dashboard with the following details:

- Search Bar:** The search bar at the top has the query "aggregateIdentifier='2b617358-8d1c-4366-82e0-108b9881da39'".
- Table Headers:** The table columns include Name, Value, and Copy.
- Table Data:** The event details are listed as follows:

| Name | Value | Copy |
|-------------------------|---|------|
| eventIdentifier | 2e348f25-1210-47cf-9a37-c868377340cf | copy |
| aggregateIdentifier | 2b617358-8d1c-4366-82e0-108b9881da39 | copy |
| aggregateSequenceNumber | 0 | copy |
| aggregateType | ProductAggregate | copy |
| payloadType | com.sop.productsservice.event.ProductCreatedEvent | copy |
| payloadRevision | | copy |
| payloadData | <com.sop.productsservice.event.ProductCreatedEvent> <productId>2b617358-8d1c-4366-82e0-108b9881da39</productId> <title>iPhone 14 Pro Max (128GB, Gold)</title><price>39000</price> <quantity>10</quantity> </com.sop.productsservice.event.ProductCreatedEvent> | copy |
| timestamp | 2023-09-26T05:55:55.582Z | copy |
- Page Controls:** Rows per page dropdown set to 10, showing 1-1 of 1.

17 ลองเรียก web service ผ่าน Postman อีกครั้ง

18 ลบ query ออกจากช่องค้นหา

19 Search

The screenshot shows the Axon Dashboard interface at localhost:8025/#query. On the left is a sidebar with icons for Settings, Overview, Search, Commands, Queries, Users, and Plugins. The main area has a title "AxonDashboard". At the top, there's a search bar with "Search: Events" selected, a dropdown for "Query time window: last hour", and a checkbox for "Live Updates". Below the search bar is a text input field "Enter your query here". To the right of the search bar is an orange "Search" button. A section titled "About the query language" provides information on tokens and event identifiers. The main content area displays a table of event logs:

| token | eventIdentifier | aggregateIdentifier | aggregateVersion | aggregateType | payloadType | payloadData | timestamp | metaData |
|-------|-----------------|---------------------|------------------|----------------|-------------------------------|---|--------------|--------------|
| 1 | 927a5f44-c5... | eddf73ac-38... | 0 | ProductAggr... | com.sop.chapter7.productse... | <com.sop.chapter7.productservice.event... | 2021-09-1... | {traceId=... |
| 0 | 113bcf28-ef... | cd494051-0f... | 0 | ProductAggr... | com.sop.chapter7.productse... | <com.sop.chapter7.productservice.event... | 2021-09-1... | {traceId=... |

A blue arrow points from the number 20 in a callout below the table up towards the search bar area.

20 สังเกตว่ามี event ใหม่เพิ่มขึ้นมา

Axon Server 4.5.6 by AxoniQ

สรุปภาพรวมของสิ่งที่เราได้สร้างขึ้นมา

