전자정부 표준프레임워크

MSA 템플릿

스프링 클라우드 스트림을 사용한 이벤트 기반 아키텍처

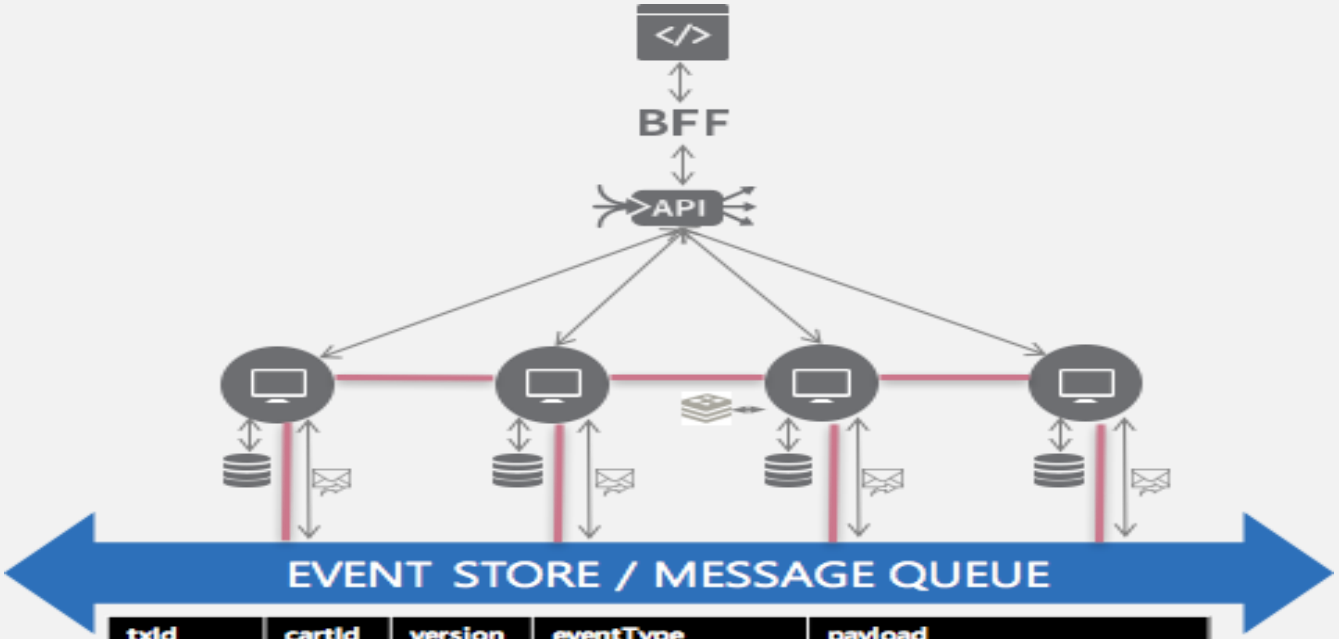
eGovFrame

Contents

eGovFrame

Event Driven Architecture

분산된 시스템 간 이벤트를 생성, 발행하고 발행된 이벤트를 필요로 하는 수신자에게 전송하고 이벤트를 수신한 수신자가 이벤트를 처리하는 형태의 시스템 아키텍처

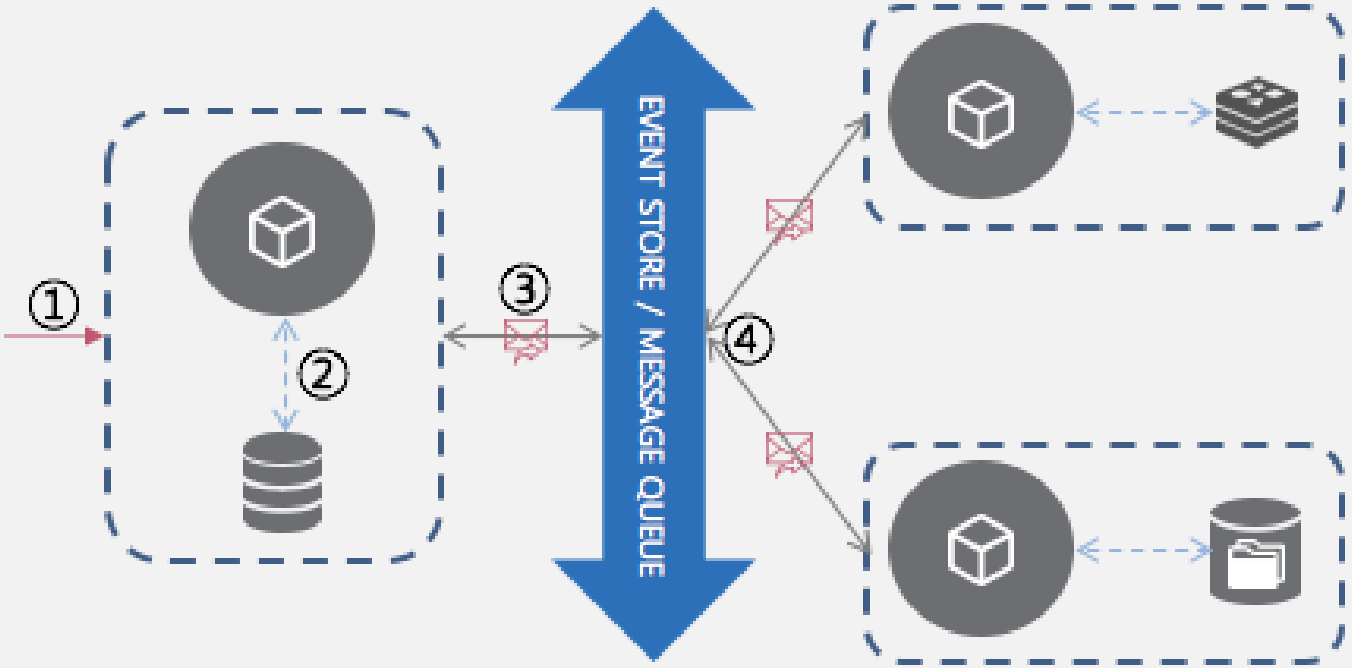


txId	cartId	version	eventType	payload
tx000123	b859	1	cartItemAdded	{"itemID": "C"}
tx000145	b859	2	cartItemRemoved	{"itemID": "C"}

https://jaehun2841.github.io/2019/06/23/2019-06-23-event-driven-architecture

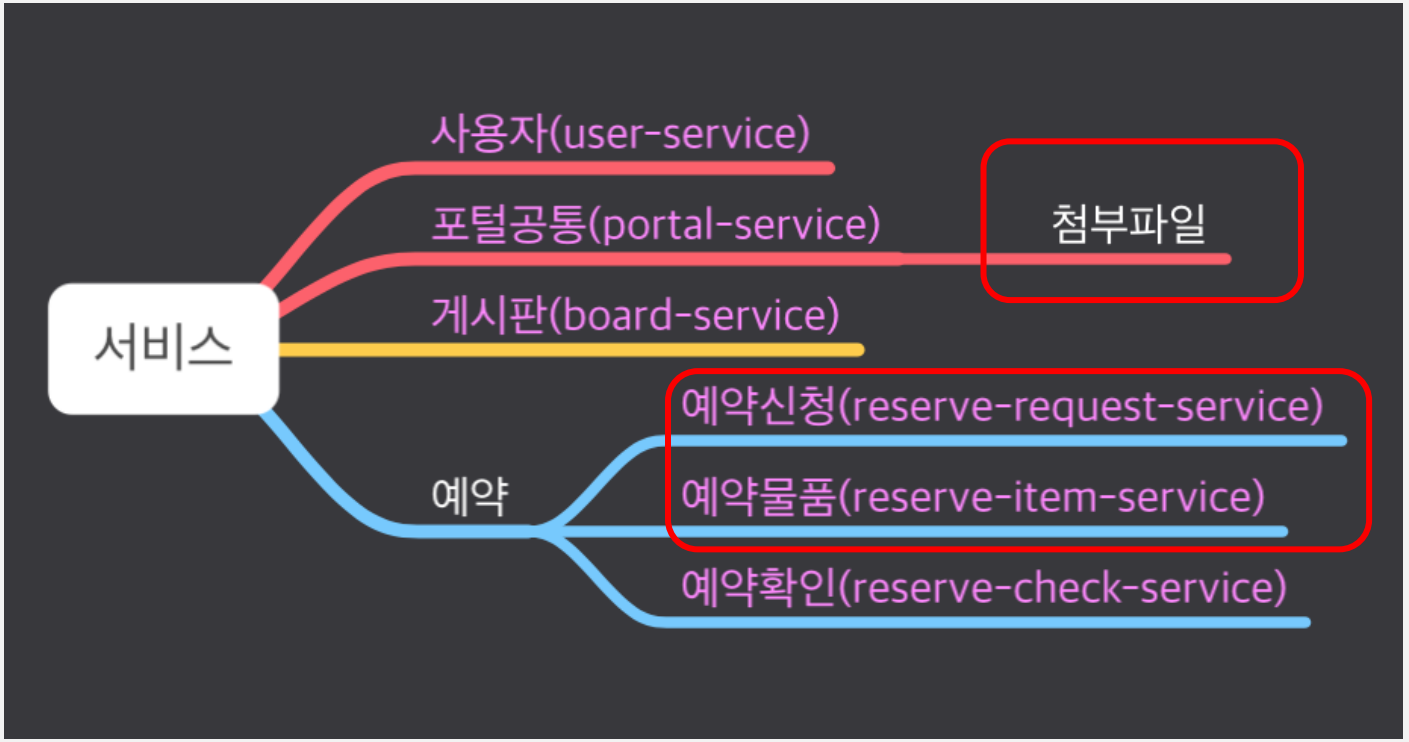
Event Driven MicroService

MSA가 적용된 시스템에서 이벤트 발생시 해당 이벤트 로그를 보관하고 이를 기반으로 동작하며, 비동기 통신을 통해 시스템 내 통합(integration)을 수행하는 아키텍처.

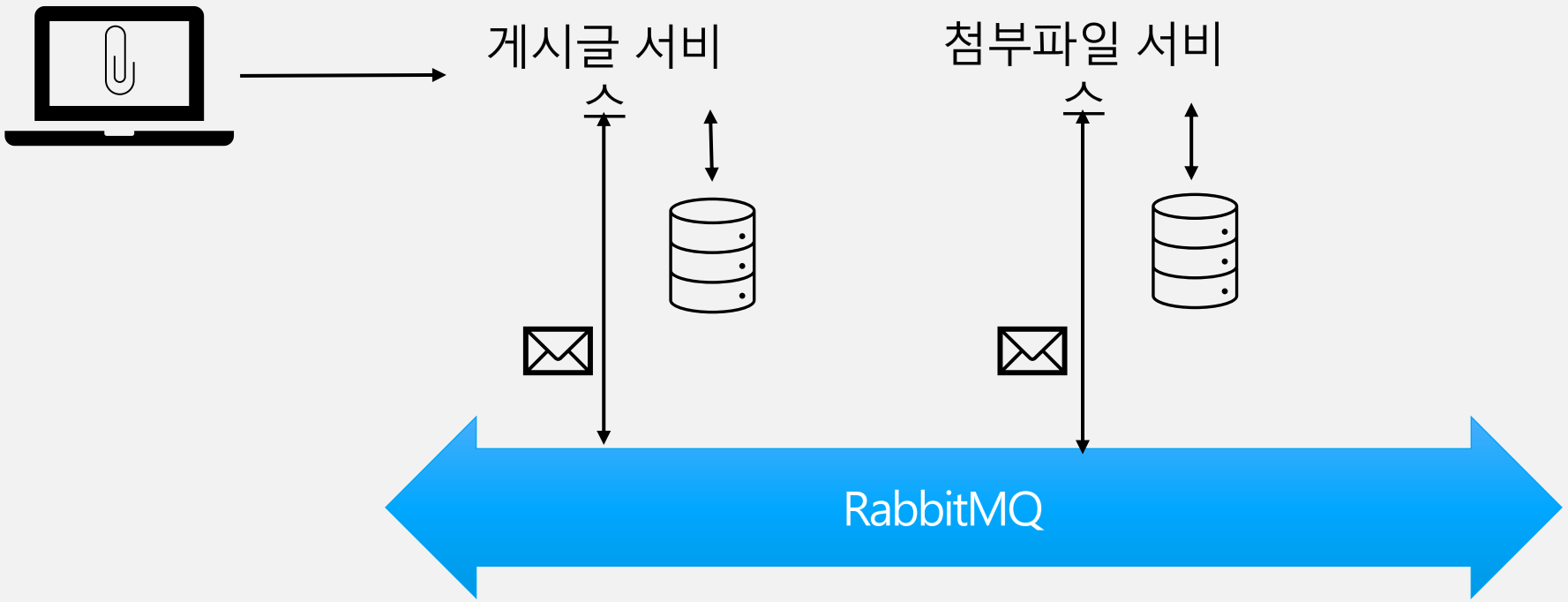


https://jaehun2841.github.io/2019/06/23/2019-06-23-event-driven-architecture

예약 서비스, 첨부파일 Entity 등록

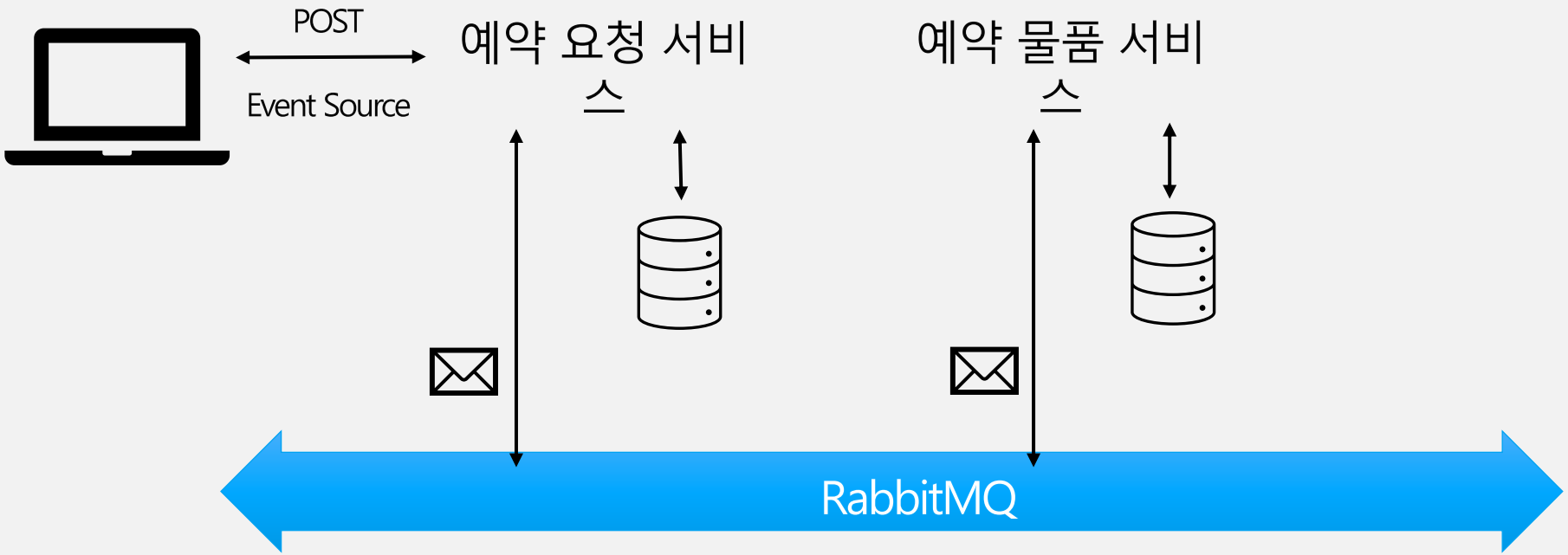


Business Flow – 첨부파일 Entity 정보 update



exchange	queue	payload
attachment-entity.topic	attachment-entity.topic	{entity: post, entityId: 1}

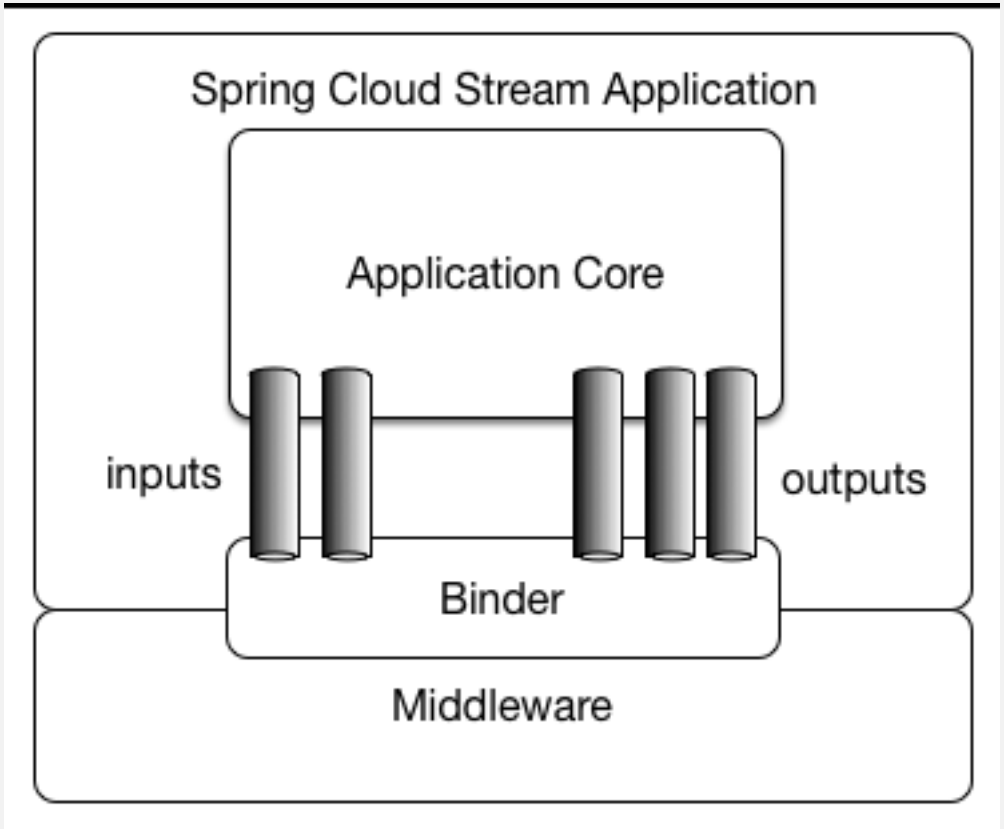
Business Flow – 실시간 예약 시 예약 물품 재고 변경



exchange	queue	payload
reserve-request.topic	reserve-request.topic	{itemId:1, reserveId:reserve_1, qty:20}
Inventory-updated.topic	Inventory-updated.topic	{reserveId:reserve_1, isSuccess:true}
success-or-not.direct	reserve_1	true

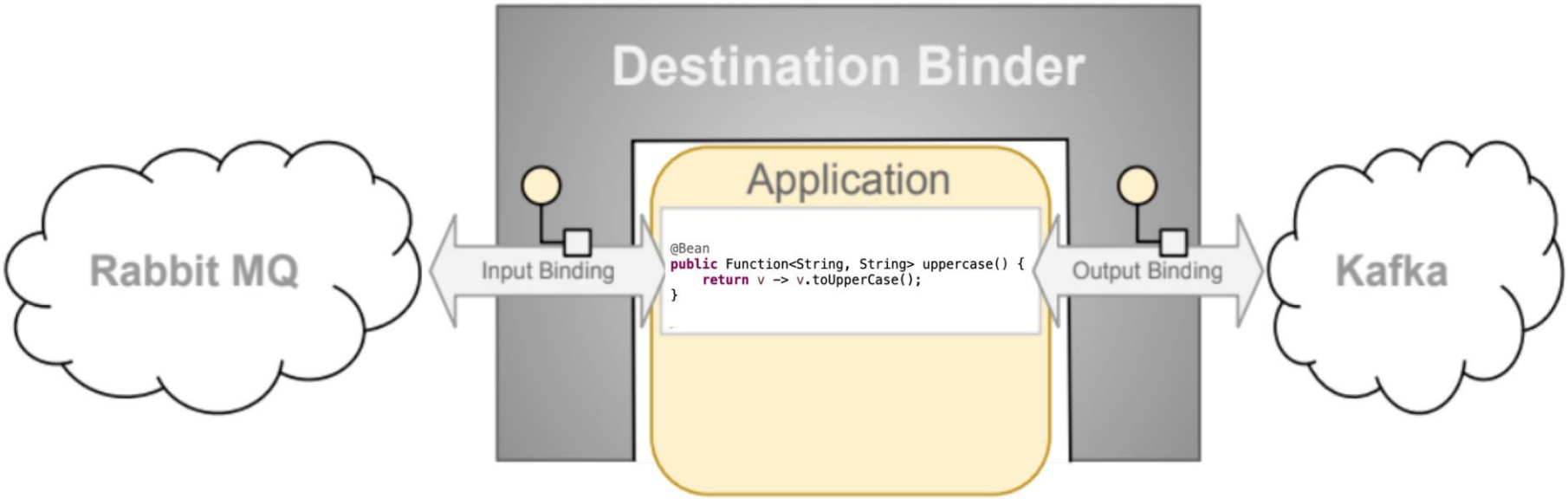
Spring Cloud Stream

- 외부 시스템에 연결할 수 있는 애플리케이션을 신속하게 구축할 수 있는 경량의 마이크로 서비스 프레임 워크
- Apache Kafka 또는 RabbitMQ 등을 사용하여 Spring Boot 어플리케이션과 메세지를 보내고 받음
- 이벤트 중심 마이크로 서비스를 구축하기 위한 프레임 워크



https://docs.spring.io/spring-cloud-stream/docs/current/reference/html/spring-cloud-stream.html#spring-cloud-stream-reference

Spring Cloud Stream – Main Concept



https://docs.spring.io/spring-cloud-stream/docs/current/reference/html/spring-cloud-stream.html#spring-cloud-stream-reference

Spring Cloud Stream – v3.2.4

build.gradle

```
dependencies {
   //messaging
   implementation 'org.springframework.cloud:spring-cloud-stream '
   implementation 'org.springframework.cloud:spring-cloud-stream-binder-rabbit '
   implementation 'org.springframework.boot:spring-boot-starter-amqp'   //Dynamic Queue 생성 시
}
```

```
spring:
  cloud:
    bus:
      destination: springCloudBus
    stream:
      function: # Consumer, Supplier, Function 타입으로 정의한 Bean name
        definition: inventoryUpdated;busConsumer
      bindings:
        busConsumer-in-0: # Spring Cloud Bus에 대한 consumer binding
          destination: ${spring.cloud.bus.destination}
        reserveRequest-out-0: # 예약 요청후 물품 재고업데이트 이벤트에 대한 producer binding
          destination: reserve-request.topic # exchange name
          group: reserved
        inventoryUpdated-in-0: # 예약 요청후 물품 재고업데이트 결과에 이벤트에 대한 consumer binding
          destination: inventory-updated.topic # exchange name
          group: reserved
```

예약 신청 서비스 Producer 및 Dynamic Queue 생성

ReserveService.java

```
...
private final StreamBridge streamBridge;
private final AmqpAdmin amqpAdmin;
...
public Mono<ReserveResponseDto> saveForEvent(ReserveSaveRequestDto saveRequestDto) {
    return create(saveRequestDto)
            .flatMap(reserveResponseDto ->
                    Mono.fromCallable(() -> {
                        //예약 저장 후 해당 id로 queue 생성
                        Exchange ex = ExchangeBuilder.directExchange(GlobalConstant.SUCCESS_OR_NOT_EX_NAME)
                                .durable(true).build();
                        amqpAdmin.declareExchange(ex);

                        Queue queue = QueueBuilder.durable(reserveResponseDto.getReserveId()).build();
                        amqpAdmin.declareQueue(queue);

                        Binding binding = BindingBuilder.bind(queue)
                                .to(ex)
                                .with(reserveResponseDto.getReserveId())
                                .noargs();
                        amqpAdmin.declareBinding(binding);

                        log.info("Biding successfully created");

                        streamBridge.send("reserveRequest-out-0", reserveResponseDto);

                        return reserveResponseDto;
                    }).subscribeOn(Schedulers.boundedElastic())
            );
}
...
```

예약 신청 서비스 Consumer & Direct Message 발행

ReserveEventConfig.java

```
@Bean
public Consumer<Message<RequestMessage>> inventoryUpdated() {
    return message -> {
        log.info("receive message: {}, headers: {}", message.getPayload(), message.getHeaders());
        if (message.getPayload().getIsItemUpdated()) {
            reserveService.updateStatus(message.getPayload().getReserveId(), ReserveStatus.APPROVE).subscribe();
        }else {
            reserveService.delete(message.getPayload().getReserveId()).subscribe();
        }

        RabbitTemplate rabbitTemplate = rabbitTemplate(connectionFactory);
        rabbitTemplate.convertAndSend(GlobalConstant.SUCCESS_OR_NOT_EX_NAME,
                message.getPayload().getReserveId(), message.getPayload().getIsItemUpdated());
    };
}

@Bean
public RabbitTemplate rabbitTemplate(final ConnectionFactory connectionFactory) {
    final RabbitTemplate rabbitTemplate = new RabbitTemplate(connectionFactory);
    rabbitTemplate.setMessageConverter(messageConverter());
    return rabbitTemplate;
}

@Bean
public Jackson2JsonMessageConverter messageConverter() {
    return new Jackson2JsonMessageConverter();
}
```

예약 신청 결과 Server Sent Events

ReserveApiController.java

```
@CrossOrigin()
@GetMapping(value = "/api/v1/requests/direct/{reserveId}", produces = MediaType.TEXT_EVENT_STREAM_VALUE)
public Flux<String> receiveReservationResult(@PathVariable String reserveId) {
    MessageListenerContainer mlc = messageListenerContainerFactory.createMessageListenerContainer(reserveId);
    Flux<String> f = Flux.create(emitter -> {
      mlc.setupMessageListener((MessageListener) m -> {
          String qname = m.getMessageProperties().getConsumerQueue();
          log.info("message received, queue={}", qname);

          if (emitter.isCancelled()) {
              log.info("cancelled, queue={}", qname);
              mlc.stop();
              return;
          }

          String payload = new String(m.getBody());
          log.info("message data = {}", payload);
          emitter.next(payload);

          log.info("message sent to client, queue={}", qname);
      });

      ...계속
```

예약 신청 결과 Direct Message 수신 API

ReserveApiController.java

```
...계속

        emitter.onRequest(v -> {
            log.info("starting container, queue={}", reserveId);
            mlc.start();
        });

        emitter.onDispose(() -> {
            log.info("on dispose, queue={}", reserveId);
            mlc.stop();
            amqpAdmin.deleteQueue(reserveId);
        });

        log.info("container started, queue={}", reserveId);
    });

    return Flux.interval(Duration.ofSeconds(5))
            .map(v -> {
                log.info("sending keepalive message...");
                return "no news is good news";
            })
        .mergeWith(f)
        .delayElements(Duration.ofSeconds(5));
}
```

프론트엔드 Event Source

ReserveEventSource.tsx

```
useEffect(() => {
  let eventSource: EventSource = null
  if (data) {
    eventSource =
                    new EventSource(`${SERVER_API_URL}${reserveService.requestApiUrl}/direct/${data.reserveId}`)

      eventSource.onmessage = event => {
                    if (event.data !== 'no news is good news') {
                      setSuccess(event.data)
                      eventSource.close()
                    }
            }
            eventSource.onerror = err => {
                    console.error('EventSource failed:', err)
                    eventSource.close()
            }
}

  return () => {
            if (eventSource) {
              eventSource.close()
              eventSource = null
            }
  }
}, [data])
```