

## SMS Simulation Exercise

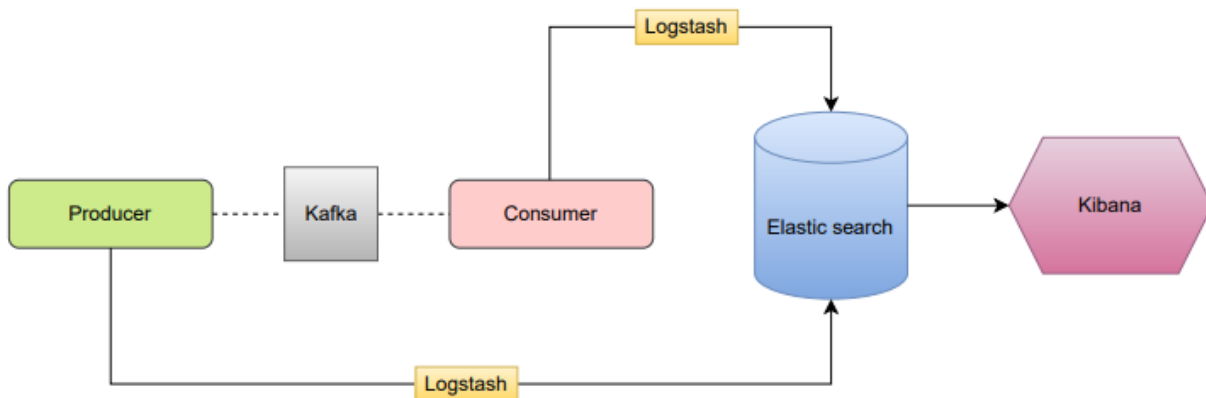
### Objectives:

The objective is to simulate sending a large number of SMS alerts, like for an emergency alert service. The simulation consists of three parts:

1. A producer that generates a configurable number of messages (default 1000) to random phone numbers. Each message contains up to 100 random characters.
2. A configurable number of senders who pick up messages from the producer and simulate sending messages by waiting a random period of time distributed around a configurable mean. Senders also have a configurable failure rate.
3. A progress monitor that displays the following and updates it every N seconds (configurable):
  - Number of messages sent so far
  - Number of messages failed so far
  - Average time per message so far

One instance each for the producer and the progress monitor will be started while a variable number of senders can be started with different mean processing time and error rate settings.

### Pipeline Architecture:



### Tech Stack:

Programming Language used: Python

1. Kafka (Message Stream Processing)
2. Elasticsearch (Indexed Storage (JSON format))
3. Logstash (Data Processing Pipeline)
4. Kibana (Progress Monitor Visualization)
5. Docker (for launching the above respective applications in a containerized environment)

## Logstash Pipeline Configuration:

```
input {  
  tcp {  
    port => 5959  
  }  
}  
  
filter {  
  json {  
    source => "message"  
  }  
}  
  
output {  
  elasticsearch {  
    hosts => "elasticsearch:9200"  
    index => "sms_index"  
    action => "update"  
    doc_as_upsert => true  
    document_id => "%{message_id}"  
  }  
}
```

## Elasticsearch index Schema:

```
{
  "sms_index" : {
    "mappings" : {
      "properties" : {
        "@timestamp" : {
          "type" : "date"
        },
        "@version" : {
          "type" : "text",
          "fields" : {
            "keyword" : {
              "type" : "keyword",
              "ignore_above" : 256
            }
          }
        },
        "end_time" : {
          "type" : "text",
          "fields" : {
            "keyword" : {
              "type" : "keyword",
              "ignore_above" : 256
            }
          }
        },
        "event_end_time" : {
          "type" : "date"
        },
        "event_start_time" : {
          "type" : "date"
        },
        "host" : {
          "type" : "text",
          "fields" : {
            "keyword" : {
              "type" : "keyword",
              "ignore_above" : 256
            }
          }
        },
        "level" : {
          "type" : "text",
          "fields" : {
            "keyword" : {
```

```
        "type" : "keyword",
        "ignore_above" : 256
      }
    },
    "logger_name" : {
      "type" : "text",
      "fields" : {
        "keyword" : {
          "type" : "keyword",
          "ignore_above" : 256
        }
      }
    },
    "message" : {
      "type" : "text",
      "fields" : {
        "keyword" : {
          "type" : "keyword",
          "ignore_above" : 256
        }
      }
    },
    "message_id" : {
      "type" : "text",
      "fields" : {
        "keyword" : {
          "type" : "keyword",
          "ignore_above" : 256
        }
      }
    },
    "path" : {
      "type" : "text",
      "fields" : {
        "keyword" : {
          "type" : "keyword",
          "ignore_above" : 256
        }
      }
    },
    "phone_number" : {
      "type" : "text",
      "fields" : {
        "keyword" : {
          "type" : "keyword",
```

```
        "ignore_above" : 256
      }
    },
    "port" : {
      "type" : "long"
    },
    "start_time" : {
      "type" : "text",
      "fields" : {
        "keyword" : {
          "type" : "keyword",
          "ignore_above" : 256
        }
      }
    },
    "status" : {
      "type" : "text",
      "fields" : {
        "keyword" : {
          "type" : "keyword",
          "ignore_above" : 256
        }
      }
    },
    "tags" : {
      "type" : "text",
      "fields" : {
        "keyword" : {
          "type" : "keyword",
          "ignore_above" : 256
        }
      }
    },
    "type" : {
      "type" : "text",
      "fields" : {
        "keyword" : {
          "type" : "keyword",
          "ignore_above" : 256
        }
      }
    }
  }
}
```

```
}  
}
```

**Elasticsearch JSON containing all details of each message being produced by Producer and sent to Sender (consumer):**

```
{  
  "_index": "sms_index",  
  "_type": "_doc",  
  "_id": "536bf41e-c7c5-437f-a6b8-d3c221d66c06",  
  "_version": 3,  
  "_score": 1,  
  "_source": {  
    "logger_name": "_main_",  
    "phone_number": "6952159981",  
    "host": "8abd4cdeea07",  
    "path": "/tmp/consumer.py",  
    "type": "logstash",  
    "message": "Message successfully sent to mobile number",  
    "message_id": "536bf41e-c7c5-437f-a6b8-d3c221d66c06",  
    "status": "SENT_TO_CLIENT",  
    "tags": [],  
    "@version": "1",  
    "event_start_time": "2023-10-27T23:55:23.000819",  
    "port": 34250,  
    "@timestamp": "2023-10-27T23:55:23.706Z",  
    "level": "INFO",  
    "event_end_time": "2023-10-27T23:55:23.706360"  
  },  
  "fields": {  
    "processing_time": [  
      706  
    ],  
    "status.keyword": [  
      "SENT_TO_CLIENT"  
    ],  
    "phone_number.keyword": [  
      "6952159981"  
    ],  
    "type": [  
      "logstash"  
    ],  
    "path": [  
      "/tmp/consumer.py"  
    ],  
    "type.keyword": [  

```

```
"logstash"
],
"@version": [
  "1"
],
"host": [
  "8abd4cdeea07"
],
"event_start_time": [
  "2023-10-27T23:55:23.000Z"
],
"logger_name": [
  "_main_"
],
"host.keyword": [
  "8abd4cdeea07"
],
"logger_name.keyword": [
  "_main_"
],
"level": [
  "INFO"
],
"message_id": [
  "536bf41e-c7c5-437f-a6b8-d3c221d66c06"
],
"@version.keyword": [
  "1"
],
"message": [
  "Message successfully sent to mobile number"
],
"event_end_time": [
  "2023-10-27T23:55:23.706Z"
],
"@timestamp": [
  "2023-10-27T23:55:23.706Z"
],
"level.keyword": [
  "INFO"
],
"port": [
  34250
],
"message.keyword": [
  "Message successfully sent to mobile number"
```

```

],
"message_id.keyword": [
  "536bf41e-c7c5-437f-a6b8-d3c221d66c06"
],
"phone_number": [
  "6952159981"
],
"path.keyword": [
  "/tmp/consumer.py"
],
"status": [
  "SENT_TO_CLIENT"
]
}
}

```

### Sample:

```

{
  "index": "sms_index",
  "_type": "_doc", "_id": "78e55757-5e3b-4e77-b689-399dfc391d71",
  "_version": 3,
  "_seq_no": 41725,
  "_primary_term": 20,
  "found": true,
  "_source": {
    "logger_name": "main_", "phone_number": "3662395987", "host": "8abd4cdeea07", "path": "/tmp/co
nsumer.py", "type": "logstash", "message": "Message successfully sent to mobile
number", "message_id": "78e55757-5e3b-4e77-b689-
399dfc391d71", "status": "SENT_TO_CLIENT", "tags": [], "@version": "1", "event_start_time": "20
23-10-28T00:08:57.367778", "port": 34250, "@timestamp": "2023-10-
28T00:08:57.578Z", "level": "INFO", "event_end_time": "2023-10-28T00:08:57.578119"
  }
}

```



## Kafka Topic (Input):

Offset Explorer 2.3.2

Browser

Properties Data Replicas

Filter

Messages Newest

Clusters

- kafka-cluster
  - localhost:9092
    - Topics
      - sms\_topic
        - sms\_topic1
          - Partitions
            - sms\_topic12
              - Partition 0
              - Partition 1

Consumers

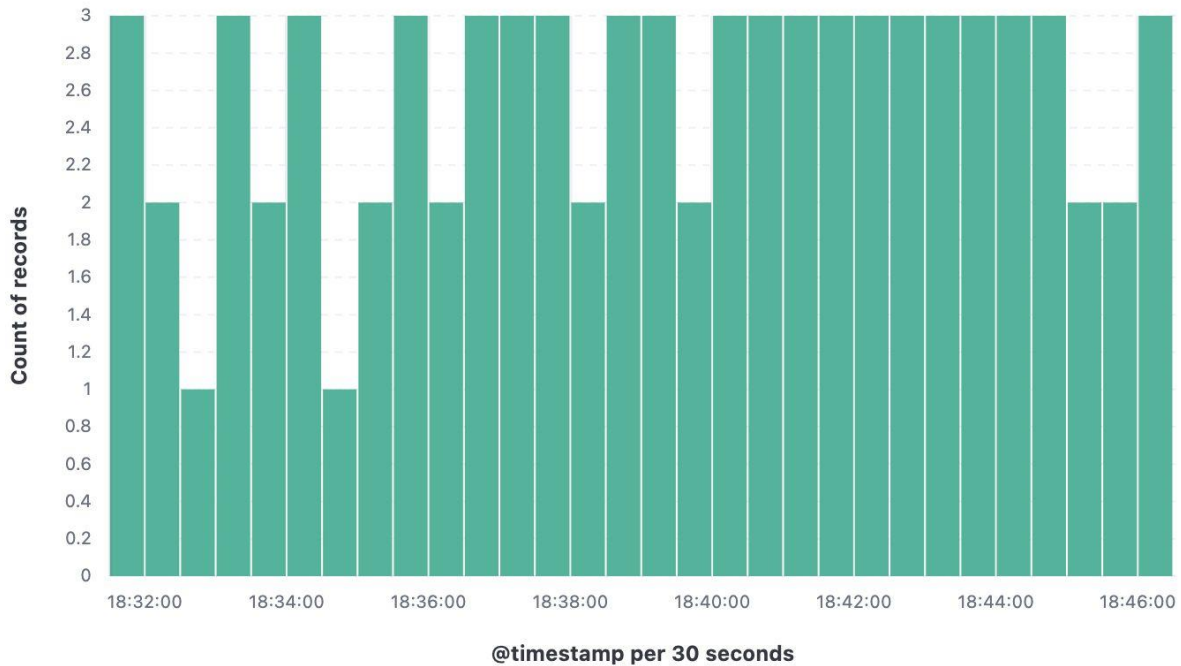
Offset	Key	Value	Timestamp
0		["phone_number": "9660507015", "message": "hbfr5zOWRdtUr1838dxhT3caahVigON0AdvPOLv5snnjTr1B7IMBU", "message_id": "a669796b-733c-4b6d-9eb9-..."]	2023-10-27 15:59:50.526
1		["phone_number": "3601701351", "message": "ny6ZHCstiu9Qmawt25Tic7Fzxx7EmaSu18UYG", "message_id": "a8ea9bd4-e238-442f-bb7d-763751bf15e3"]	2023-10-27 16:00:10.555
2		["phone_number": "8190703058", "message": "1nBCvXN6o9oeDvW7Q2Oh5LxjpZx48VAXQkjc4nuRMo0nyfbzVD0E1J", "message_id": "b62f7370-7892-4ab7-97-..."]	2023-10-27 16:00:40.921
3		["phone_number": "2902926951", "message": "ZEGuLauzwhpQrLUo4pAHm2kMz0jLS2VU687UcN2v", "message_id": "c3c24c6b-b160-45c4-8c37-21bfa23a177b"]	2023-10-27 16:01:21.305
4		["phone_number": "8861906041", "message": "flnAQHvVITz8VmZOm7xy2ZONG2IRC", "message_id": "7a425597-b2a7-4b4b-a93a-18c03a9b43fd"]	2023-10-27 16:01:51.351
5		["phone_number": "0198501888", "message": "QwVR", "message_id": "81635b48-a3ea-4645-90ca-c1b2c880e30e"]	2023-10-27 16:02:11.715
6		["phone_number": "1166998443", "message": "qRzruTAErFR8KHVUNe3UawKfCYL", "message_id": "b8d1d2db-ddac-4a20-b885-be29feb9845d"]	2023-10-27 16:02:21.725
7		["phone_number": "7519778449", "message": "bNvoc1BacNApPz9RF50ODXU5HnZx8shgPmgldRM6", "message_id": "52ecd8a2-a66e-47e1-9c0c-0069f7cb8-..."]	2023-10-27 16:02:31.739
8		["phone_number": "3479882471", "message": "63UwCnUibABMqTKolgaeulshkPlp7tyCELEbCfwaIAD", "message_id": "4906df37-0157-4b2c-b18b-643338d67c2-..."]	2023-10-27 16:02:41.754
9		["phone_number": "0233290388", "message": "ohy", "message_id": "559a2925-dfc7-45fd-9ec1-798c7ca968de"]	2023-10-27 16:02:52.103
10		["phone_number": "7317331969", "message": "KjmgchD2IolZ6corENHRS7YPJ846ES1PwPzDTyyUieD6mz2APT9dNgeAmLCcx8DG8EqGMW5AqUshLe6Uf5Q37q", "m-..."]	2023-10-27 16:03:02.119
11		["phone_number": "0159518411", "message": "RtVZCbcv4WbAXnZpMJ4", "message_id": "848146db-bddc-4b07-9887-df87540701d3"]	2023-10-27 16:03:22.142
12		["phone_number": "2038956911", "message": "mfWV1ZbrghKQNJUIQr", "message_id": "a195eead-ac0d-4629-a34a-ef8adfbbbe2f"]	2023-10-27 16:03:32.158
13		["phone_number": "2035528737", "message": "MYRoBPG", "message_id": "f016bf48-8d86-4383-953e-64d89f43ab26"]	2023-10-27 16:03:42.489
14		["phone_number": "6219715486", "message": "knR6waGuk6Qqz2HYMKooWopbDuWKGz2tUxQjphwK", "message_id": "25102cfd-4580-4e7c-a3a9-581e838de-..."]	2023-10-27 16:04:12.515
15		["phone_number": "7773809242", "message": "MnfxCSIRkaLTlRCPAB6jB3pPhknWNRxTxaAGUQDnLQdI88zd4", "message_id": "c787aefc-1739-4185-ac98-16bd-..."]	2023-10-27 16:04:22.532
16		["phone_number": "4327488369", "message": "1BZ3HtfQsJ9GakhSogwVUZnDVBh82CJA38ph3HihMdseZS95qYavfKWDIKrahep9isgluWYqMFUW6rmrCzshFHsXm-..."]	2023-10-27 16:04:32.879
17		["phone_number": "0450620710", "message": "8YTAwmTY7FR31i4AM4ANoleEuEIEI4bvcf8lB4B8vDfandv8MhTbK", "message_id": "Ec73460d-605b-Adf6-0046-c-..."]	2023-10-27 16:04:42.888

Offset: 0  
Offset Hex: 0  
Message Length: 157

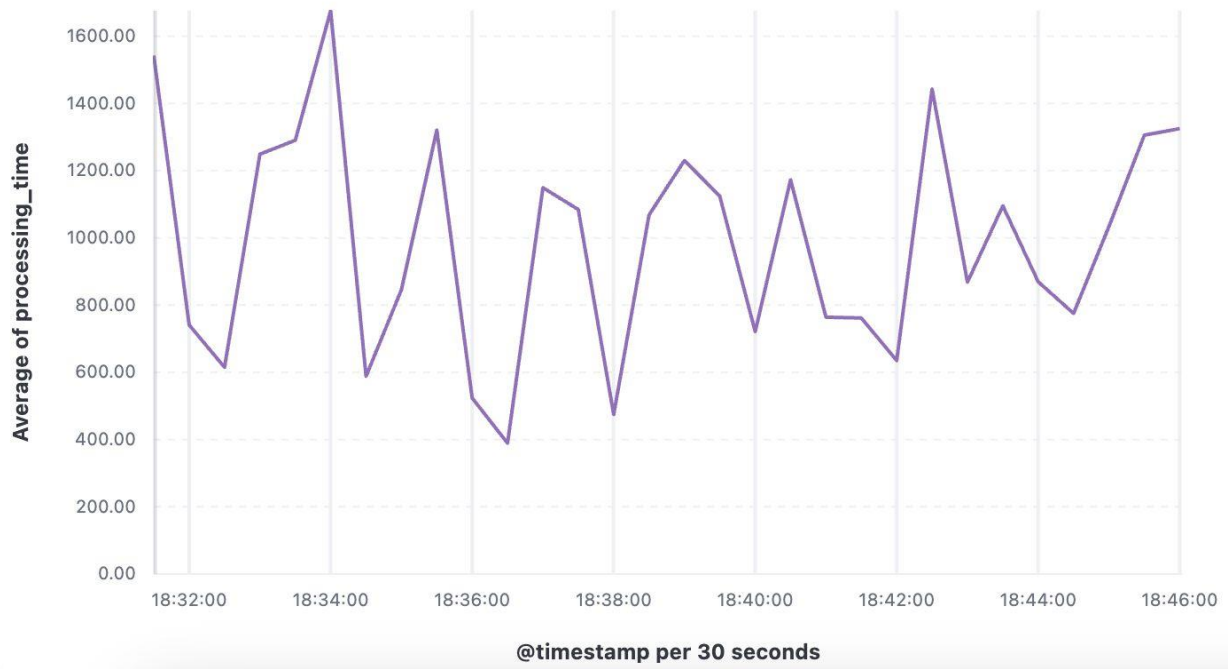
Ready [Messages = 372] [55,445 Bytes] [114 ms]

Max Messages 1000

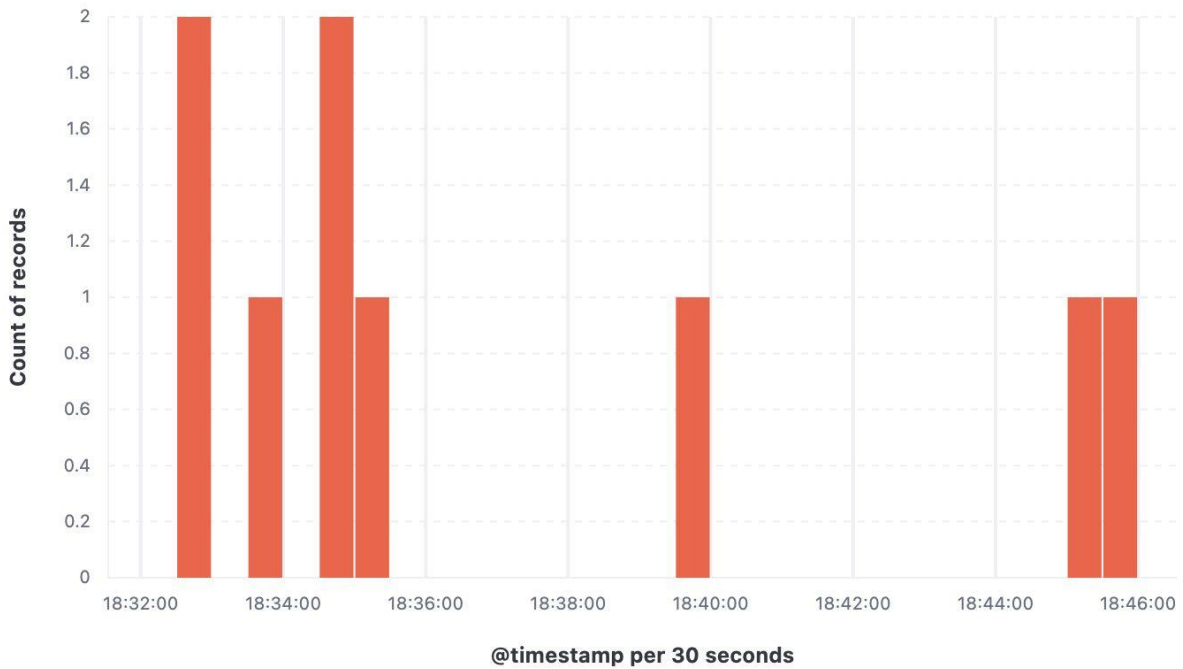
Number of messages sent so far



Average time per message so far



Number of messages failed so far



Dashboard Snapshot:

