# SMS Simulation Exercise

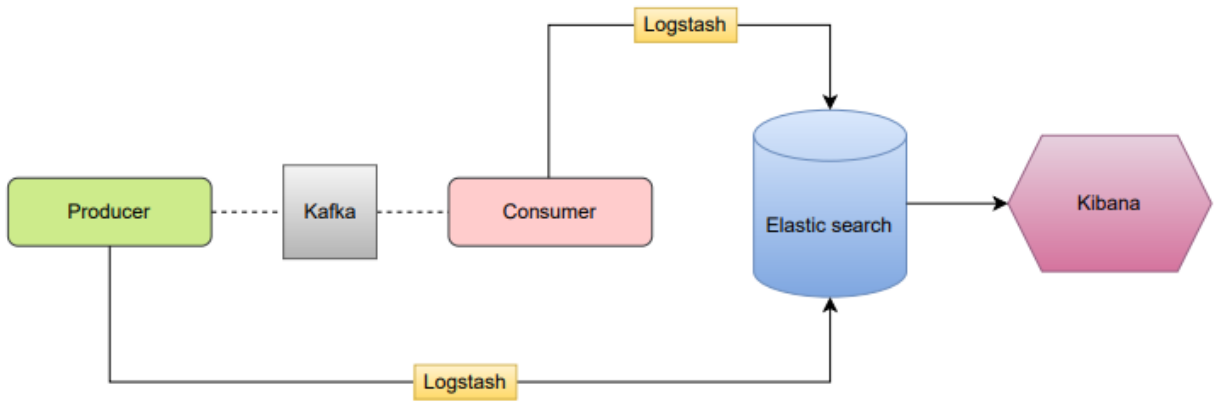
**Objectives:**

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": [
```

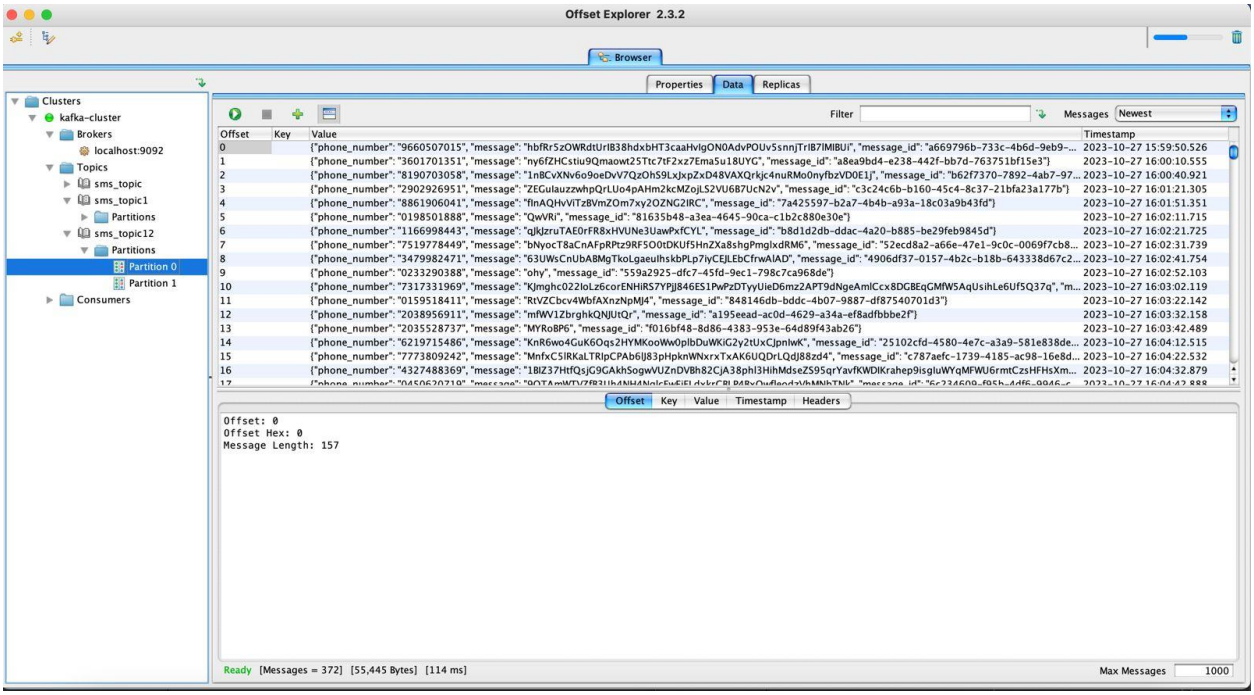
```
  "logstash"
],
"@version": [
  "1"
],
"host": [
  "8abd4cdeea07"
],
"event_start_time": [
  "2023-10-27T23:55:23.000Z"
],
"logger_name": [
  "_main_"
],
"host.keyword": [
  "8abd4cdeea07"
],
"logger_name.keyword": [
  "_main_"
],
"level": [
  "INFO"
],
"message_id": [
  "536bf41e-c7c5-437f-a6b8-d3c221d66c06"
],
"@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"
```

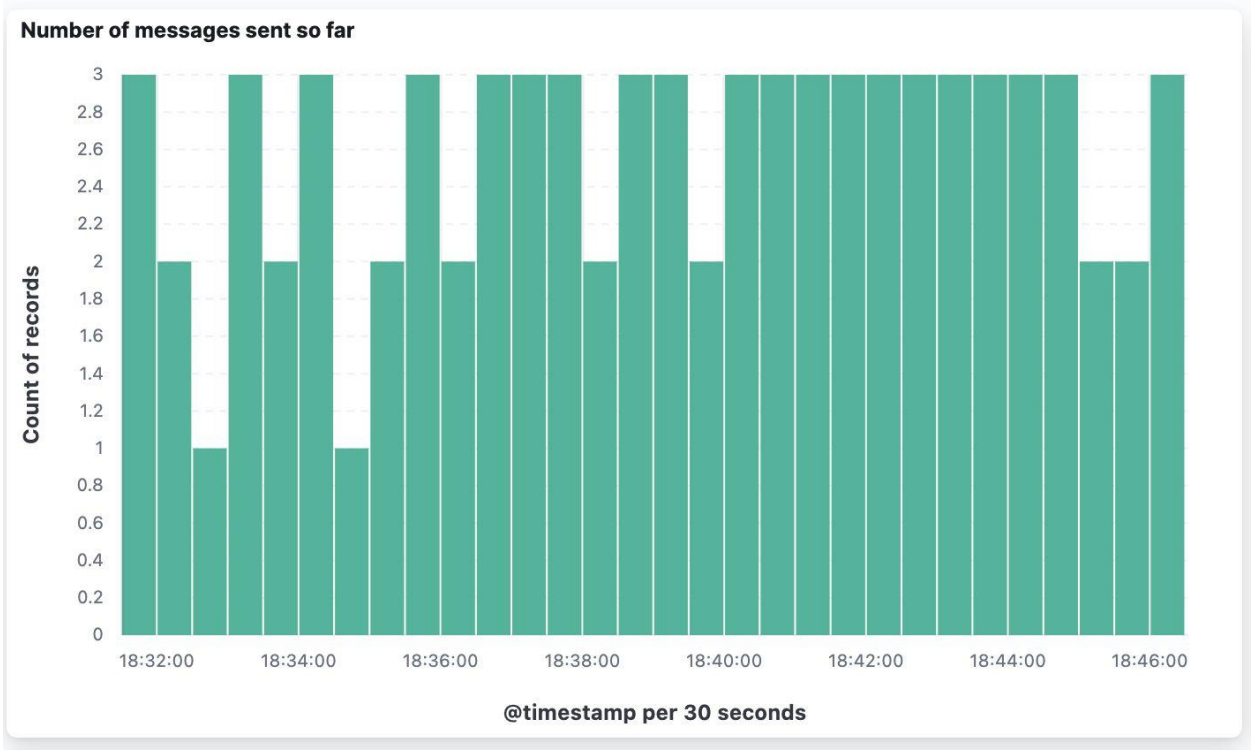
```
    ],
    "message_id.keyword": [
      "536bf41e-c7c5-437f-a6b8-d3c221d66c06"
    ],
    "phone_number": [
      "6952159981"
    ],
    "path.keyword": [
      "/tmp/consumer.py"
    ],
    "status": [
      "SENT_TO_CLIENT"
    ]
  }
}
```

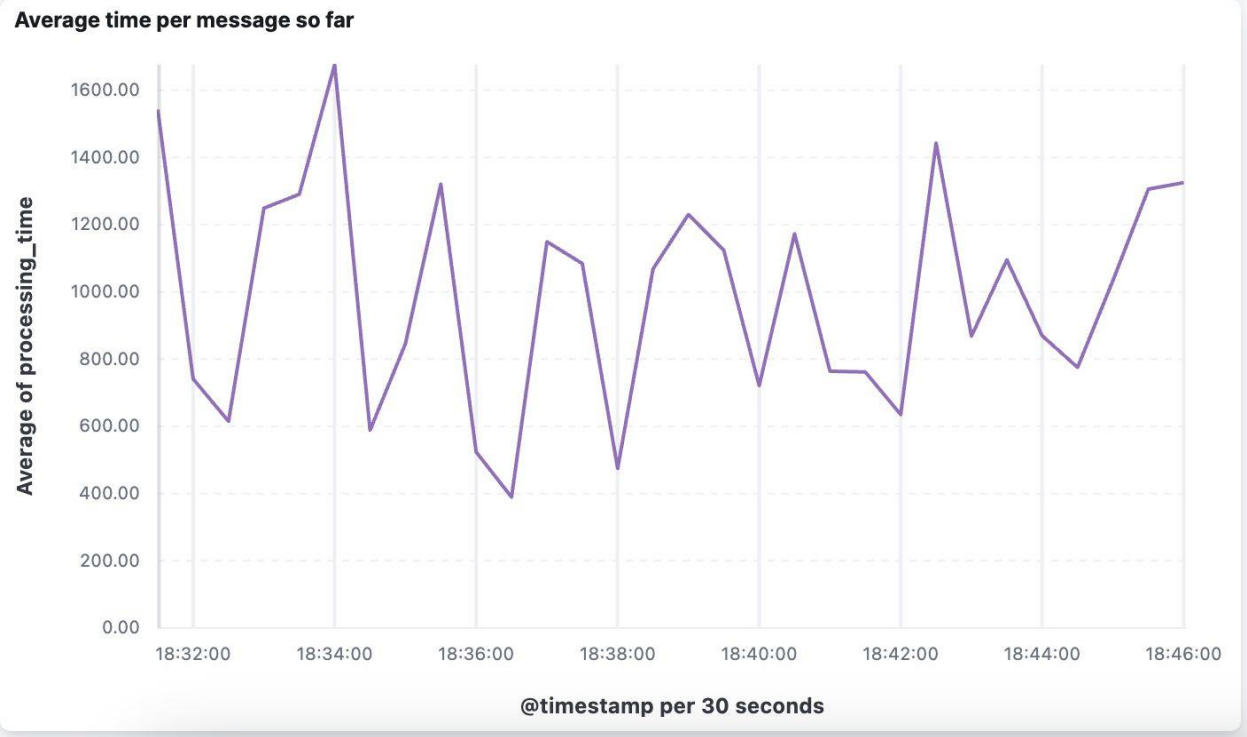

**Sample:**

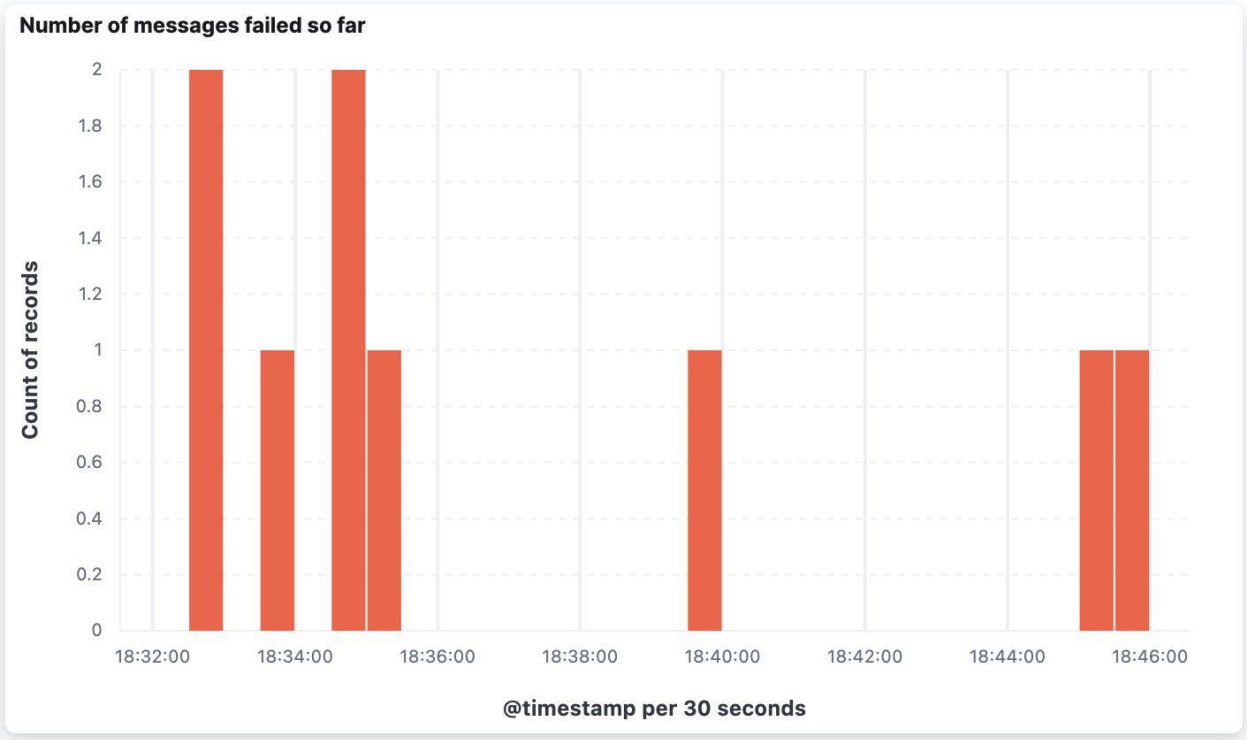

```
{
"index":"sms_index",
"_type":"_doc","_id":"78e55757-5e3b-4e77-b689-399dfc391d71",
"_version":3,
"_seq_no":41725,
"_primary_term":20,
"found":true,
"_source":{
"logger_name":"main_","phone_number":"3662395987","host":"8abd4cdeea07","path":"/tmp/co
nsumer.py","type":"logstash","message":"Message 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):




Average time per message so far
Average of processing_time
1600.00
1400.00
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
18:32:00
18:34:00
18:36:00
18:38:00
18:40:00
18:42:00
18:44:00
18:46:00
@timestamp per 30 seconds


Number of messages failed so far
Count of records
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
18:32:00
18:34:00
18:36:00
18:38:00
18:40:00
18:42:00
18:44:00
18:46:00
@timestamp per 30 seconds

## Dashboard Snapshot: