

Riddhi Pratim Das - 6361832

Lab6-

WebApi_Handson Kafka Integration with C#:

Apache Kafka is a distributed event streaming platform used for high- performance data pipelines, streaming analytic, data integration, and mission-critical applications.

It allows:

Producers to send data (messages),

Topics to categorize the data,

Consumers to read it.

Kafka Architecture Overview

Producer: Sends messages to a topic.

Topic: Logical channel for messages.

Partition: Sub-division of a topic for load balancing.

Broker: Kafka server storing data.

Consumer: Reads messages from topics.

Zookeeper: Manages Kafka brokers and cluster coordination

Starting Zookeeper:

```
PS C:\Users\KIIIT> java --version
java 18.0.2 2022-07-19
Java(TM) SE Runtime Environment (build 18.0.2+9-61)
Java HotSpot(TM) 64-Bit Server VM (build 18.0.2+9-61, mixed mode, sharing)
PS C:\Users\KIIIT> cd C:\kafka
PS C:\kafka> .\bin\windows\zookeeper-server-start.bat .\config\zookeeper.properties
[2025-07-19 18:48:55,856] INFO Reading configuration from: \config\zookeeper.properties [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,860] WARN \tmp\zookeeper is relative. Prepend \ to indicate that you're sure! [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,869] INFO clientPortAddress is 0.0.0.0:2181 [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,871] INFO secureClientPort is not set [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,871] INFO observerWatcherPart is not set [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,871] INFO metricsProvider.className is org.apache.zookeeper.metrics.impl.DefaultMetricsProvider [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,873] INFO autoPurge.snapshotInterval set to 3 [org.apache.zookeeper.server.DataDirCleanupManager]
[2025-07-19 18:48:55,873] INFO autoPurge.purgeInterval set to 0 [org.apache.zookeeper.server.DataDirCleanupManager]
[2025-07-19 18:48:55,876] INFO Purge task is not scheduled. [org.apache.zookeeper.server.DataDirCleanupManager]
[2025-07-19 18:48:55,876] WARN Either no config or no queue defined in config, running in standalone mode [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,878] INFO Log4j 1.2 jmx support not found; jmx disabled. [org.apache.zookeeper.jmx.ManagedUtil]
[2025-07-19 18:48:55,878] INFO Reading configuration from: \config\zookeeper.properties [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,877] WARN \tmp\zookeeper is relative. Prepend \ to indicate that you're sure! [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,878] INFO clientPortAddress is 0.0.0.0:2181 [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,877] INFO secureClientPort is not set [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,877] INFO observerWatcherPart is not set [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,877] INFO metricsProvider.className is org.apache.zookeeper.metrics.impl.DefaultMetricsProvider [org.apache.zookeeper.server.quorum.QuorumPeerConfig]
[2025-07-19 18:48:55,877] INFO ServerMetrics initialized with provider org.apache.zookeeper.metrics.impl.DefaultMetricsProvider@6dbb1374 [org.apache.zookeeper.server.ServerMetrics]
[2025-07-19 18:48:55,786] INFO ACL digest algorithm is: SHA1 [org.apache.zookeeper.server.auth.DigestAuthenticationProvider]
[2025-07-19 18:48:55,786] INFO zookeeper.DigestAuthenticationProvider.enabled = true [org.apache.zookeeper.server.auth.DigestAuthenticationProvider]
[2025-07-19 18:48:55,786] INFO zookeeper.snapshot.trust.empty = false [org.apache.zookeeper.server.persistence.FileTxnLog]
[2025-07-19 18:48:55,726] INFO [org.apache.zookeeper.server.ZooKeeperServer]
[2025-07-19 18:48:55,726] INFO [org.apache.zookeeper.server.ZooKeeperServer]
[2025-07-19 18:48:55,726] INFO [org.apache.zookeeper.server.ZooKeeperServer]
[2025-07-19 18:48:55,726] INFO [org.apache.zookeeper.server.ZooKeeperServer]
[2025-07-19 18:48:55,726] INFO [org.apache.zookeeper.server.ZooKeeperServer]
[2025-07-19 18:48:55,726] INFO [org.apache.zookeeper.server.ZooKeeperServer]
[2025-07-19 18:48:55,726] INFO [org.apache.zookeeper.server.ZooKeeperServer]
[2025-07-19 18:48:55,726] INFO [org.apache.zookeeper.server.ZooKeeperServer]
[2025-07-19 18:48:55,726] INFO [org.apache.zookeeper.server.ZooKeeperServer]
```

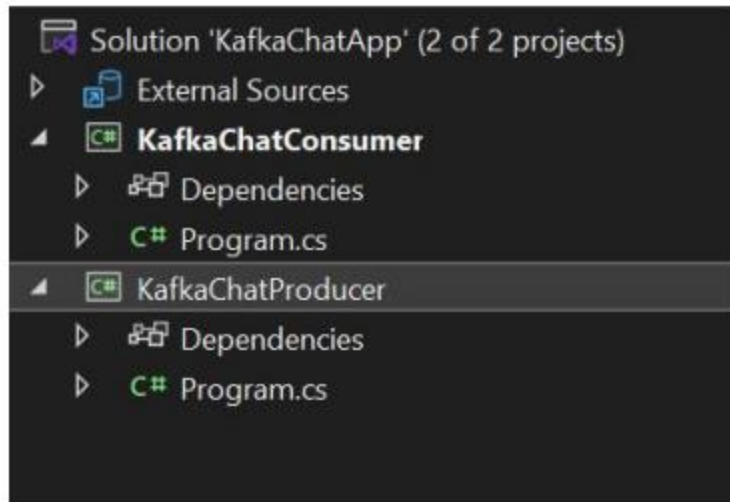
Starting Kafka Server:

```
PS C:\Users\KIIIT> java --version
java 18.0.2 2022-07-19
Java(TM) SE Runtime Environment (build 18.0.2+9-61)
Java HotSpot(TM) 64-Bit Server VM (build 18.0.2+9-61, mixed mode, sharing)
PS C:\Users\KIIIT> cd C:\kafka
PS C:\kafka> .\bin\windows\kafka-server-start.bat .\config\server.properties
[2025-07-19 18:50:05,194] INFO Registered kafka:types:kafka.Log4jController MBean (kafka.utils.Log4jControllerRegistration$)
[2025-07-19 18:50:05,500] INFO Setting -D jdk.tls.rejectClientInitiatedRenegotiation=true to disable client-initiated TLS renegotiation [org.apache.zookeeper.common.X509Util]
[2025-07-19 18:50:05,611] INFO starting [kafka.server.KafkaServer]
[2025-07-19 18:50:05,612] INFO Connecting to zookeeper on localhost:2181 [kafka.server.KafkaServer]
[2025-07-19 18:50:05,640] INFO [ZooKeeperClient Kafka server] Initializing a new session to localhost:2181. [kafka.zookeeper.ZooKeeperClient]
[2025-07-19 18:50:05,733] INFO Client environment:zookeeper.version=3.8.4-9316c2a7a97e1666d8f41593f34dddfc36ecc436c, built on 2024-02-12 22:16 UTC [org.apache.zookeeper.ZooKeeper]
[2025-07-19 18:50:05,733] INFO Client environment:host.name=19.6.186.240 [org.apache.zookeeper.ZooKeeper]
[2025-07-19 18:50:05,733] INFO Client environment:java.version=18.0.2 [org.apache.zookeeper.ZooKeeper]
[2025-07-19 18:50:05,734] INFO Client environment:java.vendor=Oracle Corporation [org.apache.zookeeper.ZooKeeper]
[2025-07-19 18:50:05,734] INFO Client environment:java.home=C:\Program Files\Java\jdk-18.0.2 [org.apache.zookeeper.ZooKeeper]
```

Creating a Kafka Topic:

```
PS C:\Users\KIIIT> java --version
java 18.0.2 2022-07-19
Java(TM) SE Runtime Environment (build 18.0.2+9-61)
Java HotSpot(TM) 64-Bit Server VM (build 18.0.2+9-61, mixed mode, sharing)
PS C:\Users\KIIIT> cd C:\kafka
PS C:\kafka> .\bin\windows\kafka-topics.bat --create --topic chat-topic --bootstrap-server localhost:9092 --partitions 1 --replication-factor 1
Created topic chat-topic.
PS C:\kafka> |
```

Solution directory for hands on 1:



1. Creating a Chat Application which uses Kafka as a streaming platform and consuming the chat messages in the command prompt's output.

Chat in Producer

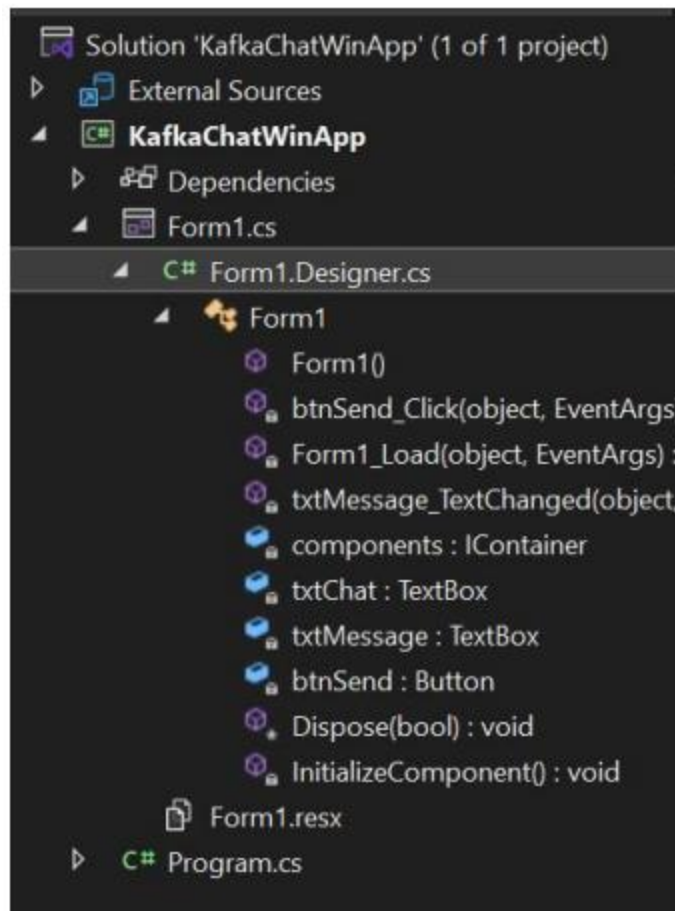
```
=== Kafka Chat Producer ===
You: HI there!!
[Sent] HI there!!
You: How are You??
[Sent] How are You??
You: Hope Everything is Good!
[Sent] Hope Everything is Good!
You: okay BYE!!
[Sent] okay BYE!!
You: exit
Producer closed.

C:\Users\KIIT\OneDrive\Desktop\Cognizant\KafkaChatApp\KafkaChatProducer\bin\Debug\net8.0\KafkaChatProducer.exe (process 30712) exited with code 0 (0x0).
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .|
```

Output in Consumer

```
=== Kafka Chat Consumer ===  
Other: Hi there!!  
Other: How are You??  
Other: HI there!!  
Other: How are You??  
Other: Hope Everything is Good!  
Other: okay BYE!!  
|
```

Solution directory for hands on 1:



2. Create a Chat Application using C# Windows Application using Kafka and consume the message in different client applications.

```
Other: Hi there!!  
Other: How are You??  
Other: HI there!!  
Other: How are You??  
Other: Hope Everything is Good!  
Other: okay BYE!!  
Other: Hi again  
Other: What You doing  
You: What You doing
```