



BUILDING APPLICATIONS USING .NET AND KAFKA

Acknowledgement

- Today I come to you from Calgary which is situated on the Ancestral Lands of the Blackfoot Confederacy: Siksika, the North and South Piikani Nations and the Kainai Tribe, including members of Treaty 7 First Nations, the Tsuut'ina Nation and the three Bands of the Stony Nation. Calgary is also home to the Métis Nation of Alberta, Region III and all those who make their home in this area



Introduction

- My name is Simon Timms and I am, amongst other things, a solution architect for the Inventive Group. I use the pronouns he and him. Today I am wearing a black shirt complete with an Inventive logo. Wear glasses and have dark hair. I am a white male and live in Calgary, Alberta, Canada.
- I am a 8-time Microsoft MVP in Developer Technologies. I do a weekly video cast with two other folks called the ASP.NET Monsters which can be found on YouTube. We cover technologies related to web development with a focus on the .NET stack.



Topics

- Engineering System Using Streams
- What is Kafka
- Using Kafka from .NET



ENGINEERING APPLICATIONS USING STREAMS

Getting Started

What's an event?

- Just something that happened

- {
 name: user logged in
 username: jane
 date: 2021-11-08 2:29PM
}

- {
 name: money transferred
 source: account 7897651
 destination: account 114547
 amount: 50
 currency: USD
}

Events are always happening

- Events hold deltas from the way the world was before
- The sum of all the events on an object give you the current state of that object
- Events can be easily parallelized and distributed
- Once an event happens it cannot be changed

Event systems you might know and love

- Windows Event Viewer
- Log files
- Audit tables in a database
- Commit logs in git

Where do these fit in?

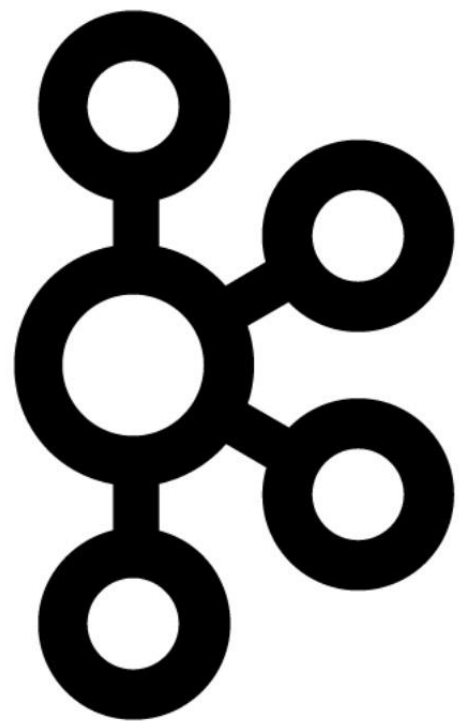
- Banking or finance software
- Medical software
- Event sourced software
- General messaging

Stream consumers

- Producers and consumers allow for decoupling
- Decoupling allows for impressive scale
- Some examples
 - Processing transaction stream looking for fraud
 - Hooking into new user stream plucking users out for special treatment
 - Processing bank transactions looking for high net worth people to target with marketing
 - Examining grocery purchases to understand reordering requirements



WHAT IS KAFKA?



APACHE
kafka®

What's it do?

- High performance, distributed stream processing
- Event persistence
- In order event replay
- Replication to different regions

Who is Using It?

- Tivago
- Rabobank
- New York Times
- Zalando
- Pinterest
- Airbnb
- Barclays
- Box
-
- 80% of Fortune 100s

APACHE KAFKA

*More than **80% of all Fortune 100 companies** trust, and use Kafka.*

Apache Kafka is an open-source distributed event streaming platform used by thousands of companies for high-performance data pipelines, streaming analytics, data integration, and mission-critical applications.



10 OUT OF **10**

MANUFACTURING



7 OUT OF **10**

BANKS



10 OUT OF **10**

INSURANCE



8 OUT OF **10**

TELECOM

Core concepts

- Event
- Producer
- Consumer
- Topic
- Partition

Topics and Partitions

- Vehicle Events
 - Partitioned by vehicle id
- Vehicles Enter Area
 - Area id
- Vehicle Entered Area
 - Area id/vehicle id
- Bank account
 - Partitioned by bank account id

Durability

- How long do messages live for?
- Where do messages go once they expire?



KAFKA ON .NET

.NET and Kafka

- Kafka is a Java project, and it shows
- The .NET client is built on top of librdkafka

Running Kafka Locally

- Using docker
- The role of ZooKeeper

Sample Producer

- Demo

Sample Consumer

- Demo

Exactly Once Processing

- Demo

Admin APIs

- Managing and inspecting topics, ACLs, brokers and other Kafka objects

Missing APIs

- There are some additional APIs which are not supported by the .NET client
 - Streams API – Adds the ability to transform and enrich streams of data. Can be very powerful
 - Connect API -



IN THE CLOUD

Support on Major Clouds

- Azure support through Apache Kafka on HD Insights
- AWS Amazon Managed Streaming for Kafka (MSK)
- Confluent Cloud
 - AWS
 - Azure
 - GCP



CONCLUSION

Apache Kafka

- Highly available stream processing
- Tested and hardened on thousands of installs around the world
- Unmatched performance
- Excellent .NET support