Millions of households around the world depend on TiVo for entertainment. From the interactive program guide to the DVR, TiVo delivers innovative products and technologies to both service providers and end customers that revolutionize how people find content across a changing media landscape.

In order to provide these video entertainment solutions, TiVo needs to process and provide data about the video entertainment itself, whether it’s movies, TV shows, cast members or images, and also use other types of data to provide those solutions, such as channels, activation status and channel permissions. In order to optimize those solutions for end users, it’s critical for TiVo to process and analyze data from the end users, including their viewing patterns, device stability, device usage and logs.

TiVo began working with Confluent and implemented Apache Kafka to better manage and leverage their data to continue their legacy of revolutionizing how people find and enjoy TV, movies and music.

"With Confluent and Apache Kafka, we have quick access to the varying types of data that allows us to move faster as a development team and allows us to respond more quickly to our users," said James Cheng, architect at TiVo.

Challenge
As the company grew, TiVo’s backend service became more complex, applications became intertwined. TiVo needed a platform that could decouple these applications, help them embrace microservices and become more stable and agile. “In the previous environment, every time we wanted to build something new it would make the structure less and less steady. It became harder and harder for us to debug and keep it afloat,” said Robert Christ, principal engineer at TiVo.

TiVo was also looking for a better way to manage the aggregation of log data, provisioning data and metadata. In order to improve customer experience, better configure set-top boxes and manage subscriber preferences, TiVo must process billions of messages each day from the

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Website
www.tivo.com

Industry
Media and Entertainment

Challenge
Decouple a growing number of backend services, manage large amounts of log data, speed time to innovation for future features

Solution
Implemented Apache Kafka® to connect data across the organization and support the move to microservices.

Results
• Reduced time to deployment
• Achieved massive scalability
• Freed developer resources
• Eliminated workflow interruption

TiVo Takes Customer-Centric Programming to New Heights with Apache Kafka®
millions of TiVo receivers globally. But the team was running into costly bottlenecks. “Prior to Kafka, we would pool all of that into our primary databases and then write applications that wanted to take advantage of it in that framework. This became very costly for the team,” said Cheng.

Lastly, TiVo wanted to speed the time to innovation for future entertainment features, such as a recommendation system that combines aggregated customer data with existing programing data. “Developing new features was taking a long time with our old system. We needed a better way to collect the clickstream log data from the customer and combine it with provisioning data,” said Cheng.

Solution

In order to combat these challenges and support a growing organization, TiVo deployed a streaming platform to connect data across the organization and support the move to microservices. TiVo implemented Kafka to pass all data through a single source of truth and make it accessible to development teams that need the data couldn’t absorb the spikes of incoming data,” said Cheng. With Kafka’s speed the team can now properly collect those messages.

Secondly, Kafka allows TiVo to read data out very quickly, and in parallel on multiple machines. “This means we can process larger amounts of data far more quickly, than we could before,” Cheng said. “Kafka also gives us flexibility in that we can now scale up/down the processing of the data according to the needs of the business, rather than be limited by what the technology was capable of.”

Results

TiVo has experienced significant results by implementing a streaming platform, including:

- **Reduced time to deployment.** “Prior to microservices, we were limited to deploying every six weeks, and all new features/capabilities would deploy at the same time. With microservices, each service can be deployed on its own schedule,” said Cheng.
  
  Part of TiVo’s previous instability was due to several applications sharing the same database. Performance to innovate and create new products. The company also utilized Kafka to build their microservices architecture and make their applications more accessible and agile. Kafka Log Compaction allowed TiVo to ensure Kafka retains accurate values for each message key within the log of data for each TiVo topic.

“Previously, we would often be unable to even collect all those messages, because our method of collection and load on one database table or use-case would impact other tables or use-cases. “That means that development and testing required a lot of time spent considering the impact across different use cases. With microservices, we no longer have to share database services,” said Cheng.

- **Achieved massive scalability.** “We can now process billions of real-time messages daily,” said Cheng. “Even during data spikes, which often happen at the top of the

“We work with Confluent because it is extremely valuable to have access to experts who know the most about Apache Kafka. It’s that feeling of security that has paid off for us.”

— Robert Christ, Principal Engineer at TiVo
hour when programming is changing, we’re processing the data as fast as we need to. And if we need it to go even faster, we simply turn on more instances."

Cheng added that TiVo encounters some use cases which simply share data, queryable via the REST API. “For those use cases, we don’t even need a traditional database. We simply load data from a Kafka topic into memory, and then serve up responses from memory. Kafka provides the persistence, which makes those use cases horizontally scalable.”

- **Freed developer resources.** “Now that we’ve built our microservices, we have freed up the ability for our developers to build and deploy new applications with the up-to-date, real-time information they need to innovate. They are able to leverage new tools and designs that were not possible in our older architecture,” said Christ.

- **Eliminated workflow interruption.** Data is now easily accessible in Kafka, and teams can access it without complex ETL jobs. “You grab the data you need, and go,” said Christ. "By reducing roadblocks, we sped up the time it takes to build new and innovative applications, which allows us to experiment with new ideas faster than we were able to before.”

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