

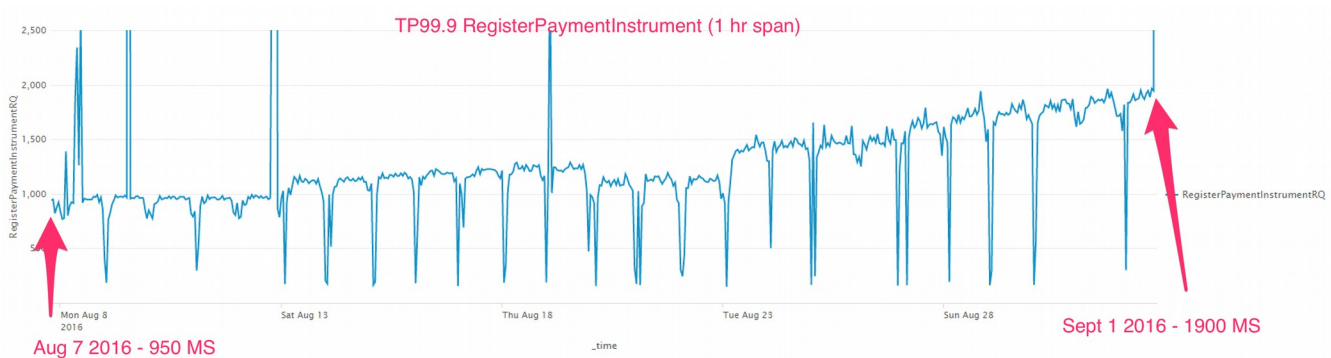
Fraud RegisterCreditCard Trend Impact of Payment Vault

Summary

For the past 2 weeks the TP99.9 latency for Payment Vault's RegisterPaymentInstrument API has been on a steady increase. In the past week, the latency grew enough to begin impacting the TP99 of the API which triggered a number of Sev2 alarms for the Payment Vault system. An investigation showed that all calls with increased latency were done with the same credit card number and from the same client (fraud). This means that only one client was being impacted by the latency and that the latency was caused by data specific to the long running requests. The latency is occurring in the database and is caused by a large number of payment instruments registered with the *same credit card number*.

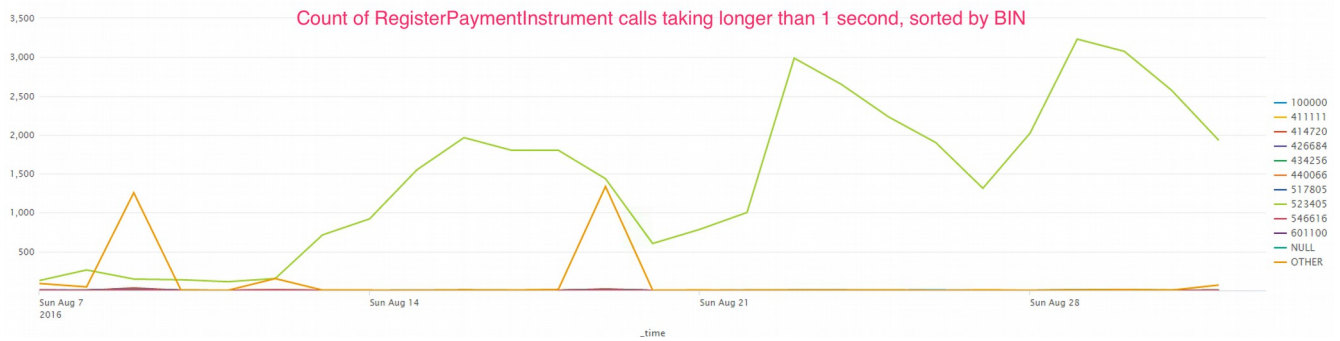
Payment Vault Performance Impact

During the month of August the TP 99.9 of the RegisterPaymentInstrument API increased from 950 MS to 1900 MS. The increase impacted the TP 99 as well which triggered a number of Sev2 alarms for the API.



The cause of the performance impact was tied to a single database query. This query searches the payment vault database in order to find duplicate payment instruments based on a number of criteria including the credit card number, expiration date, first name, and last name. If there are no existing payment instruments in the database which matches the previously mentioned fields then a new payment instrument is inserted into the database. The query performs best when the cardinality of the credit card number is low.

Further analysis of the slow API calls exposed one huge commonality: they all use the same credit card number.



Usually registering a payment instrument multiple times would not be a problem. PaymentVault would use the de-duplication logic to avoid creating a new payment instrument and then return the existing one. In the case of fraud, the first name / last name are changing on each RegisterPaymentInstrument request which forces payment vault to create a **new instrument each time**. As more and more payment instruments are registered with the same card number, the performance slows.

The fraud system is registering upwards of 3,000 new payment instruments per day with the same credit card number. If this trend continues, each RegisterPaymentInstrument API call with this card number will continue to slow.

