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So even though](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=0&mode=live&start=61.41233333333332) [Pub/Sub is a GCP service, there's no](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=0&mode=live&start=63.74374999999999) [platform linkage forcing publishers or](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=0&mode=live&start=66.55839999999999) [subscribers to also be GCP services.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=0&mode=live&start=69.20225) [Pub/Sub is pretty easy to use, but the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=0&mode=live&start=72.191) [pricing of Pub/Sub is complex and not very](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=0&mode=live&start=74.153) [transparent. 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This makes](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=9.759) [it similar to other messaging middleware](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=12.144999999999996) [such as Kafka or Flink or to SQS on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=14.458285714285713) [AWS. 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It's real time,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=23.433285714285716) [which means that messages which are sent](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=26.187571428571424) [from senders will become available to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=28.87114285714286)[receivers almost immediately. If you have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=31.65085714285714) [worked with any messaging middleware](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=33.878571428571426) [before, Pub/Sub is going to seem pretty](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=35.13785714285714) [familiar. It's a way to achieve](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=37.57671428571429) [many-two-many asynchronous messaging. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=39.543) [is because it decouples senders from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=43.450375) [receivers. We can have senders, which send](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=46.13462500000001) [a whole lot of messages and make sure that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=48.172000000000004) [they do not overwhelm the receivers.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=50.42699999999999) [Likewise, we can have receivers which are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=52.868) [down at a given point in time but then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=54.579) [come up a little later and are able to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=56.8965) [catch up with the stream of messages.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=59.121199999999995) [Pub/Sub is reliable, scalable, and secure.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=61.517) [The reliability comes from the fact that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=65.397) [messages are persisted in internal](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=67.321) [storage, and that is replicated and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=69.79600000000002) [sharded for you. It's scalable because](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=72.38225) [there are internal load balancers and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=74.61100000000002) [distributed file systems for the messages.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=77.00249999999998) [And, finally, it's secure because all data](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=79.883) [on the GCP is protected with end-to-end](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=82.452)[encryption. Now let's quickly talk about](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=86.32737499999998) [Pub/Sub's delivery semantics and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=88.13766666666668) [guarantees. Pub/Sub guarantees](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=90.25800000000001) [at-least-once delivery. So Pub/Sub does](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=92.66299999999998) [not perform de-duplication, and that is a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=95.8475) [responsibility of the client. Pub/Sub is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=98.95249999999999) [designed to be used closely with Dataflow,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=101.36250000000001) [in particular to get exactly-once](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=104.11828571428572) [processing. Again, this is an important](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=107.28471428571432) [point. Pub/Sub by itself does not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=109.36799999999997) [guarantee de-duplication or ordering.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=111.72800000000001) [Google's intention was for Pub/Sub and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=115.063) [Dataflow to be used together. Dataflow has](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=116.747) [had some problems with its adoption. And,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=119.74125) [as a result, this has also hampered](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=122.07012499999999)[Pub/Sub's adoption to a certain extent. In](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=123.856) [any case, let's move on with a discussion](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=126.37650000000001) [of Pub/Sub's other features. Pub/Sub is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=128.2302) [serverless. It does not require us to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=130.91566666666668) [provision or maintain compute. It is also](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=132.64225000000005) [auto-scaling along several different axes.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=135.2938333333333) [So the number of senders, receivers, the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=137.943) [number of messages, and the size of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=140.572625) [messages, all of these axes can scale](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=142.208) [automatically, and Pub/Sub will gracefully](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=145.005) [cope with that scaling. As we've already](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=147.403)[discussed, Pub/Sub is reliable, and any](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=150.33950000000002) [distributed system that's reliable needs](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=152.5745) [to have internal replication mechanisms.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=155.02285714285713) [Pub/Sub has those mechanisms, and that's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=157.69) [why it's able to maintain high](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=159.906) [availability. Now we've been using the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=162.33685714285718) [terms publisher and subscriber quite](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=164.07128571428578) [freely, so let's understand exactly how](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=165.79925000000003) [these work in Pub/Sub. Because Pub/Sub is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=167.72371428571435) [messaging middleware, multiple](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=170.2515) [applications can send out messages. These](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=171.779)[applications are called publishers. These](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=175.20920000000004) [messages, in turn, go into Pub/Sub, which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=178.2885) [then redistributes them to various](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=181.05885714285708) [subscriber applications. The publishers](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=184.24900000000002) [are sources of events. These are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=186.5653333333333) [asynchronous events which can arise at any](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=189.01000000000002) [point in time. The subscribers are syncs](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=191.31350000000003) [for those events. And Pub/Sub plays an](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=194.27985714285714) [intermediary or buffering role. 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Topics are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=2&mode=live&start=203.58588888888892) [used to organize messages. 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The first](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=38.95433333333333) [way to use the seek feature is by seeking](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=41.378) [to a timestamp. When we do this, every](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=43.75) [message which was received before the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=46.402) [timestamp is going to be marked as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=47.956) [acknowledged, and every message received](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=50.306) [after the timestamp is going to be marked](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=52.634) [as unacknowledged. To replay messages from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=54.914) [the past, we simply seek to a timestamp in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=57.618) [the past. All messages received after that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=60.987272727272696) [point are going to be replayed. Please](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=63.0102857142857) [note that in order to seek to a past](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=65.2012) [timestamp, we need to have turned on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=67.345) [retain acknowledged messages flag. Now if](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=70.017) [you'd like to discard a bunch of messages,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=73.03655555555557) [we simply seek to a point in time in the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=74.83355555555556) [future. This can come in handy if we have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=78.12333333333333) [a failed publisher or if we have system](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=80.85266666666668) [maintenance which has caused the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=83.30016666666666) [generation of a large number of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=84.851) [not-required messages. The alternative to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=86.798) [seeking to a timestamp is seeking to a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=89.74257142857141) [snapshot. Now a snapshot is an explicit](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=92.68725) [construct newly added to Pub/Sub which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=95.013) [allows us to capture the message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=98.758) [acknowledgment state of a subscription at](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=100.096) [a point in time. So when we create a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=102.37342857142855) [snapshot, we are capturing the message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=105.442) [status for every message in the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=107.561) [subscription. This includes both](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=110.29357142857143) [acknowledged and unacknowledged messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=111.87340000000002) [at the time of the snapshot. What's more,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=113.57875) [the snapshot is also going to retain all](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=116.9805) [messages which arrive after the snapshot](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=119.48514285714285) [was created, and these can then be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=122.29044444444445)[replayed. Seek to snapshot and seek to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=126.15755555555558) [timestamp are both handy ways to replay](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=128.26024999999998) [messages. They have multiple use cases in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=131.18450000000004) [Pub/Sub. One use case, which comes up](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=134.12771428571432) [pretty often, is to update code on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=136.36875000000003) [subscriber side safely. So we can take a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=139.81433333333328) [subscriber offline, make changes to it,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=142.93985714285714) [bring it back online, and then seek to a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=144.81850000000003) [previous point in the subscription.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=147.88349999999997) [Another common use case is to recover from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=149.753) [crashes. If a subscriber happens to crash,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=152.63033333333334) [it's possible for it to come up and then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=155.233) [seek to a point from just before the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=157.799) [crash. Both of these two use cases seek to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=161.2745555555555) [the past. It's also possible that we want](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=164.26979999999998) [to seek to a point in the future, for](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=166.28800000000004) [instance, to bulk acknowledge unnecessary](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=168.97585714285717) [messages and avoid processing needlessly.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=171.70420000000004)[And one last but important use case is for](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=174.804) [back testing subscribers on previous or](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=177.364) [historical data. Both of these features come in handy.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=5&mode=live&start=179.878)

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[Pub/Sub's pricing is surprisingly complex,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=2.288) [so let's understand it. There are costs](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=4.972) [associated with message ingestion, with](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=7.3285) [message delivery, and then with the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=9.352) [special features related to seeks, namely,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=12.250857142857141) [to creating snapshots and to retaining](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=15.1965) [acknowledged messages. Cloud pricing can](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=18.479333333333333) [often change pretty dramatically, so it's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=21.142) [important that you refer to the latest](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=23.090999999999998) [pricing information on the Google docs.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=25.725714285714286) [The URL is given above. At the heart of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=28.110124999999996) [Pub/Sub's pricing is this pricing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=31.080500000000004) [schedule, which tells us how monthly data](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=32.498) [volume affects price per terabyte. Now](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=35.82585714285714) [this acronym, TiB, stands for tebibyte.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=39.852000000000004) [This is 2 raised to 40, which is a little](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=44.016) [more than the standard terabyte. So we can](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=46.579636363636375) [see that there is a free tier for the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=49.736090909090905) [first 10 GB, and then after that, the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=51.3365) [price per terabyte varies falling from $60](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=54.48057142857143) [per terabyte to $50 per terabyte and down](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=58.446) [to $40 per terabyte beyond 150 TiB. Please](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=62.276624999999996) [note that this applies to both message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=67.22257142857143) [ingestion and delivery, that is, to both](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=69.36866666666667) [incoming messages into topics, as well as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=72.62599999999999) [outgoing messages out on subscriptions. To](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=75.695625) [make this concrete, let's study a simple](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=78.0375) [pricing scenario. Let's say that we have 1](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=79.945) [topic which is generating messages of 1024](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=82.91842857142856) [KB, and we have 2 subscriptions on this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=85.454625) [topic. One message is being delivered to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=89.30142857142857) [the topic every second. That works out to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=93.0454) [1 MiB per second. So when we calculate the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=96.45750000000001) [total per-second data usage, we are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=99.84357142857141) [ingesting one message every second, and we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=102.54499999999999) [are delivering two messages every second.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=105.19000000000003) [So that gives us a total data usage of 3](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=107.429) [MiB per second. And when we convert that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=110.41677777777778) [to a monthly usage figure, we arrive at](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=113.959) [the figure of 7.416 TiB per month. From](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=115.9972222222222) [this, let's go ahead and subtract the free](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=120.805375) [tier of 10 GB. That gives us 7.406 TiB.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=122.9917) [This needs to be multiplied by the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=128.785) [per-terabyte rate of $60, and this leads](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=130.806) [to a bill of around $444 for the month.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=134.06100000000004) [Now there's quite a bit of fine print that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=140.287) [we should be aware of in Pub/Sub pricing.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=141.993) [The smallest billable volume per request](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=145.181) [is one kilobyte, and cross-project billing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=148.06528571428564) [works as follows. Bills are always going](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=152.212) [to be payable by the project which hosts a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=154.7) [resource. So let's say, for instance, you](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=157.52960000000004) [have topics or subscriptions which exist](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=159.15949999999992) [inside a project, and then we have other](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=160.77866666666665) [applications which may or may not be on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=162.876) [the GCP at all. Using those resources, the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=164.9097777777777) [hosting project is the one which will have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=168.151875) [to foot the bill. Next, let's move on and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=170.4024) [talk about snapshot and seek-related](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=173.766) [pricing. Let's begin by understanding the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=176.3166666666667) [pricing of turning on retaining](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=178.65142857142857)[acknowledged messages. So let's extend our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=182.02360000000002) [pricing scenario. As before, we have the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=185.1013333333333) [steady incoming 1 MiB per second. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=187.46928571428575) [assume we have negligible backlog, and we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=190.15750000000003) [have configured acknowledged messages to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=193.01433333333333) [be retained for seven days. In addition to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=195.201) [the $444 bill that we just saw, we will](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=199.48899999999995) [also have to pay for the backlog of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=202.27539999999993) [acknowledged messages. That works out to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=205.247) [86.4 GiB per day, which in turn translates](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=208.3335) [to 605 GiB in a week multiplied by the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=211.71555555555557) [rate of $ 0.27 per GiB-month. That's the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=215.69060000000002) [rate that Google currently charges. And so](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=219.66314285714287) [we can see that turning on the retain](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=221.90844444444443)[acknowledged messages flag can incur an](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=224.14316666666667) [additional bill running upwards to several](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=227.39166666666668) [hundred dollars a month. So be careful](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=229.576) [using this feature. Next, let's move on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=232.834) [and talk about snapshot fees. When a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=235.57688888888893) [snapshot is created, a one-time fee is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=238.01749999999998) [going to be charged for the backlog of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=240.44555555555556)[unacknowledged messages. The fee that's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=242.362) [going to be charged will be equivalent to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=245.93633333333332) [storing that backlog for the full](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=247.72471428571427) [seven-days period. And in addition, there](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=250.45533333333333) [will be an incremental charge for all new](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=252.75971428571432) [messages. Calculating this incremental](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=256.2151666666666) [charge can get even more complicated, but](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=257.72150000000005) [it's important for us to understand how](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=260.3616666666666) [this happens. Let's assume that we've](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=263.05057142857146) [snapshotted the same subscription we've](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=264.8273333333333) [been working with so far. This means that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=266.24949999999995) [the data published in the first minute is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=269.137375) [going to be 60 MiB. That data is going to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=271.43699999999995) [be stored for 7 days minus 1 minute. The](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=274.5559999999999) [data published in the second minute is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=277.0669999999999) [also 60 MiB. That's going to be stored for](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=280.032) [7 days minus 2 minutes, and so on. Doing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=283.03833333333336) [some complex arithmetic tells us that when](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=286.22742857142856) [the snapshot expires, the backlog size is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=288.87014285714287) [going to be 605 GiB. This means that on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=292.544) [average over this seven days, the size of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=296.6720000000001) [the backlog is going to average 1/2](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=298.7310000000001) [multiplied by 605 multiplied by 7 days,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=301.2351428571428) [which gives us 2118 GiB-days of storage.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=306.0403333333333) [And at a rate of $ 0.27 per GiB-month,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=311.841) [this works out to a bill of $19. We can](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=315.203) [see that in this example, turning on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=318.9555555555555) [snapshotting was far more cost-effective](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=320.417) [than turning on retain acknowledge](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=323.393) [messages. Snapshotting cost us just $19.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=326.2013333333333) [Retaining acknowledged messages set us](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=329.405) [back by $163. Oh, and by the way, all of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=331.05916666666656) [this is over and above the $444 bill that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=335.8458999999998) [we incurred in the first place without](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=339.0885555555557) [either of these features. It also neglects](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=341.19257142857157) [the one-off fee for the backlog of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=343.8765714285713)[unacknowledged messages when the snapshot](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=346.744) [was created. 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That gets us to the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=355.7807777777776) [end of this module in which we introduced](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=357.67699999999996) [Pub/Sub. We saw how it's a global,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=360.173) [reliable messaging middleware. It's a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=362.331) [managed service on the Google Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=365.522) [Platform, which provides a way to decouple](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=366.851) [senders and receivers. It's global because](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=369.533) [both senders and receivers can be located](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=373.00000000000006) [anywhere in the world. 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A lot](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=408.98366666666664) [of examples back to back culminating in a Hangouts application.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=0caa6e51-b886-432e-bc4f-e89df399268f&clip=6&mode=live&start=411.826)

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And in the course of this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=40.182500000000005) [module, we'll see how easy it is to wire](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=41.927) [up Cloud Functions so that it writes out](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=44.91233333333332) [to a Google Cloud Storage bucket each time](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=47.24888888888887) [a particular message is published on a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=49.69733333333332) [given topic. We will also put into](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=52.754428571428576) [practice some really cool features](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=54.808874999999986) [including the seek to timestamp and the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=56.304) [seek to snapshots functionalities, which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=58.89249999999999) [were recently added to Pub/Sub. Both of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=60.800999999999995) [these are effectively ways to re-create or replace the messages on a stream.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=0&mode=live&start=63.54671428571429)

[Web Console: Working with Topics, Subscriptions, and Messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live)

[Let's get started with our first simple](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=2.359) [demo. We'll see how to enable the Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=4.5596250000000005) [API, and we'll then move on and create a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=7.041375000000002) [topic and a subscription using the web](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=9.334111111111113) [console. And then we'll work with the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=12.040285714285712) [subscription a little bit using the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=13.703999999999997) [command line. So let's get started. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=15.36266666666667) [switch over to the web console. Note here](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=17.374857142857145) [that we are using a project called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=19.436) [spikey-ps. Just make sure that whatever](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=21.287666666666667) [project you're using for this purpose has](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=24.373) [billing enabled. Otherwise, you will not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=26.967499999999998) [be able to work with paid resources like](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=29.1175) [Pub/Sub. Next, navigate to the top left](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=32.57880000000001) [corner with the three horizontal lines.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=35.09899999999999) [This is the Navigation menu, sometimes](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=37.488) [called the hamburger, also known as the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=39.681333333333335) [Products and Services menu. We will be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=42.468666666666664) [referring to these three horizontal lines](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=44.547714285714285) [again and again through the course of this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=46.10566666666667) [class. We click on those three horizontal](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=49.539399999999986) [lines and navigate down into the Big Data](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=51.5962857142857) [section where we find Pub/Sub. Note the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=54.47737500000001) [little pin icon, which is highlighted in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=57.71628571428571) [green. This is a way of pinning this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=60.364) [particular menu item so that it always](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=62.54875000000003) [appears right up top within our Navigation](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=64.70525000000002) [menu. Let's go ahead and pin the Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=68.01366666666668) [menu item and then navigate into it. There](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=70.11600000000003) [are three submenu items, Topics,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=73.712) [Subscriptions, and Snapshots. Let's click](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=75.452) [on the Topics tab for now. The first thing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=78.00325000000001) [that we'll need to do there is to enable](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=81.09233333333333) [the Pub/Sub API. So let's go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=83.47049999999999) [click that big blue button. Just FYI,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=86.356) [enabling APIs is a required step because](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=88.7235) [this is a way of ensuring that users do](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=91.58637499999999) [not inadvertently end up consuming](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=94.13700000000001) [expensive resources. Pub/Sub is not very](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=96.272) [cheap to use. Once the API is enabled, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=99)[get a big blue Create a topic button.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=102.70555555555555) [Let's go ahead and click on that. We are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=105.214) [prompted for a topic name. Notice how this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=108.032) [topic name is fully qualified by the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=110.53471428571429) [project name, which here is spikey-ps.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=113.47642857142858) [Let's go ahead and create this topic. And](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=116.12642857142856) [this will then allow us to work with our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=119.35799999999998) [topic by clicking on those three vertical](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=122.13187500000001) [dots over on the extreme right. The action](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=124.53525000000002) [we currently wish to undertake is to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=128.18742857142857) [create a new subscription. In addition,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=130.22533333333334) [notice how it's also possible to publish](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=132.19028571428572) [messages, delete the topic, and manage the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=134.436) [permissions. It's also possible to import](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=137.99599999999998) [messages into this topic or export all of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=140.15385714285713) [the messages in this topic. In any case,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=142.60366666666664) [for now, let's cover the first option,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=144.97057142857136) [which is create subscription. Next, we are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=146.712)[prompted for a subscription name, and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=150.0893333333334) [there is a helpful tool tip with all of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=151.87825000000004) [the guidelines governing those names.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=154.40275000000005) [Let's name this topic sale\_day\_offers\_sub.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=157.018) [Note that we are asked for a delivery](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=161.163) [type, and the default is pull. As the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=163.59944444444454) [tooltip tells us, pull subscribers are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=167.30371428571428) [going to need to request delivery. Push](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=169.33042857142857) [subscribers, on the other hand, will need](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=171.72183333333334) [to specify an endpoint URL, and messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=173.88285714285712) [are going to be pushed to that particular](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=176.27322222222222) [endpoint URL. Pull is fine, so let's go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=178.77333333333334) [with the default, and let's also explore](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=182.38400000000004) [some of the additional options. We can see](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=184.0797142857143) [that the additional options there start](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=186.7202857142857) [with the acknowledgment deadline. As the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=189.22600000000003) [tooltip tells us, this is how long Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=192.99599999999998) [is going to wait for the subscriber to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=194.779125) [acknowledge receipt before resending the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=197.07285714285715) [message. The default is 10 seconds. Next](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=199.78714285714287) [comes the message retention deadline,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=202.98350000000002) [which by default is set to 7 days. And,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=205.091) [finally, there is a checkbox there which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=208.29442857142857) [is not checked by default, which will](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=210.30337500000002) [allow us to retain acknowledged messages.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=212.462) [Let's accept all of those defaults and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=216.513) [move on by hitting Create. Our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=217.97337499999992) [subscription has now come into existence,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=221.34050000000002) [and this shows up when we browse our topic](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=223.062125) [name. The count of the number of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=226.21111111111108) [subscriptions is now set to 1. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=228.434) [switch from the Topics pane to the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=232.138125) [Subscriptions pane by clicking the menu on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=233.686) [the left. Here we can see that our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=235.49) [subscription sale\_day\_offers\_sub does](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=237.89) [indeed appear. It is a pull subscription](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=240.5) [with the acknowledgment deadline of 10](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=244.168) [seconds. Let's browse back to the Topics](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=246.96314285714288) [tab and go ahead and publish a few topics.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=248.90566666666663) [To do so, we click on the topic name. And](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=251.582) [right up top, we see the Publish Message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=254.953) [button. Let's click on that. We now enter](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=256.98466666666667) [our message. This is just any old text](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=259.994) [stream. In this case, our message is three](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=262.8037142857142) [values separated by commas. The first is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=265.447375) [an identifier, the second is the product](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=268.32642857142844) [name, that's the iPhone, and the third is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=271.00114285714284) [a description of the offer, which here](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=273.1679999999998) [says 5% off. Let's go ahead and publish](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=276.3506666666668) [this message, and then in quick succession](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=279.63114285714295) [go ahead and publish another couple of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=281.4480000000001) [messages as well. The next is an offer on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=283.73400000000004) [Reebok shoes for 20% off. And after that,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=286.2673333333333) [we publish a third message. This one has a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=288.8563749999999) [key-value pair associated with it. This is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=292.6167142857143) [metadata, so the key is the deadline, and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=295.20975) [the value is 15 hours. The message payload](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=297.9534285714286) [is no different. It's for a TV, which is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=301.5055) [selling at 15% off. And let's publish one](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=304.94200000000006) [last message using the web console. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=307.66285714285704) [one is for a dress shirt with a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=309.77688888888883) [buy-one-get-one-free offer. We've created](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=313.58419999999995) [a topic and published a few messages.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=315.6905555555556) [Let's switch to Cloud Shell by clicking on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=317.985) [that little arrow icon on the top right.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=319.955) [Remember that Cloud Shell is effectively](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=323.126) [running a terminal session on an ephemeral](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=324.816) [VM. It's a great way to run command tools](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=328.62750000000017) [like the gcloud command line utility. A](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=331.3888888888887) [command line prompt appears before us.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=335.0261428571429) [This is quite a verbose prompt. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=337.421) [simplify it by running this optional shell](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=339.32) [script, which will cause a simple arrow to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=341.61685714285716) [become our new command prompt. The next](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=344.53028571428575) [command is going to invoke the gcloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=347.61600000000004) [pubsub utility. Note here that we are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=350.1046666666667) [invoking the gcloud pubsub subscriptions](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=353.55574999999993) [pull command. We follow this by the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=355.983) [auto-ack flag. This is a way of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=359.6277142857142) [automatically acknowledging every message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=361.59633333333323) [pulled from the subscription followed by](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=362.7805) [the name of the subscription itself, which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=364.75114285714284) [is sale\_day\_offers\_sub. By default, this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=367.34325) [is going to pull just a single message.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=370.19300000000004) [Remember that Pub/Sub does not guarantee](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=373.226) [either ordering or deduplication, so we've](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=375.129) [got to see what we get, and it turns out](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=378.274) [that the message that we just pulled is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=380.324) [for the iPhone with 5% off. Let's go ahead](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=383.14355555555534) [and run this command again, but this time](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=386.8547500000001) [with the limit field. The default value of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=389.1788571428571) [the limit field is 1, and that's why when](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=391.73066666666665) [we omitted the limit field a minute ago,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=394.14050000000003) [we got back just the one message. Now when](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=396.0917777777777) [we run the limit 10 command, it's going to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=398.921) [pull up to 10 messages from the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=402.24099999999993) [subscription queue. Remember that the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=405.34800000000007) [subscription is going to delete](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=407.23357142857145) [acknowledged messages, and that's why we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=408.5128) [only get two new messages. These](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=410.99914285714283) [correspond to the TV with 15% off and the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=412.9683333333333) [dress shirt. Notice how this command](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=415.8734285714286) [returns the data, the message ID, as well](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=418.36) [as any additional attributes. And it turns](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=421.37) [out that we had indeed specified an](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=423.881) [additional attribute for the TV offer. The](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=425.501) [key was deadline, and the value was 15](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=427.867875) [hours. And we can see that that is indeed](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=430.5696666666666)[faithfully reproduced when we pull from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=433.6244999999999) [the subscription. You might recall that we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=436.5145999999999) [had published the dress shirt offer last,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=438.7986249999999) [that is, after an offer on Reebok, but](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=440.8900000000001) [that has not appeared yet. So we are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=443.98177777777784) [receiving the messages out of order. No](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=447.00100000000003) [worries. Let's go ahead and rerun our pull](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=448.912375) [command, and this time the Reebok shoes](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=451.42657142857144) [offer does indeed show up. If we try and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=453.704) [pull yet one more time from the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=457.22919999999993) [subscription, we find that 0 items are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=458.945)[returned because, of course, we have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=461.346) [pulled all of the messages and auto-acknowledged them all.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=1&mode=live&start=463.178)

[gcloud: Working with Topics, Subscriptions, and Messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live)

[Let's plunge right into her second demo in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=2.165) [which we will see how Pub/Sub can be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=4.701) [worked with using gcloud from the command](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=6.8343333333333325) [line. This time we'll create our topic and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=9.591857142857144) [our subscription using gcloud. Let's start](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=11.674750000000005) [by activating the Cloud Shell, and then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=15.025857142857141) [let's run gcloud pubsub topics create,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=17.516285714285715)[followed by the name of our topic, which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=20.163) [here is spikey-bugs. The topic is created](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=23.07125) [successfully, and if we now switch back to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=26.032857142857136) [the web console and navigate to the Topics](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=28.200250000000004) [tab, we can see that it appears there,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=30.546) [spikey-bugs with 0 subscribers. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=33.789) [switch back to the command line and create](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=37.183) [a subscription using gcloud pubsub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=39.25900000000001) [subscriptions create. Notice how we also](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=42.369) [have to specify the name of the topic,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=45.347444444444456) [which is spikey\_bugs, the acknowledgment](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=47.709) [deadline, which is 60 seconds, and then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=49.655) [the name of the subscription itself, which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=51.737) [is spikey\_bugs\_dev\_sub. Once this is done,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=54.293)[let's go ahead and create yet another](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=58.129) [subscription. This is on the same topic.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=60.63775) [This subscription is called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=63.751) [spikey\_bugs\_reports\_sub. If we switch to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=66.7206)[the web console and go ahead and click on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=68.0198) [the Subscriptions tab, we can see that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=70.11633333333329) [both of these subscriptions indeed appear](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=71.9945) [there. If we go back to the Topics tab and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=75.07180000000001) [click on the Refresh button there, we can](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=77.56439999999995) [see that spikey\_bugs will indeed show up](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=79.660125) [as having two subscriptions. Let's now](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=82.00514285714286)[switch back to the command line and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=85.49125) [publish a few messages on the spikey\_bugs](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=87.04585714285714) [topic, gcloud pubsub topics publish,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=89.3322) [followed by the topic name, the message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=93.24683333333333) [flag, and then the text message, that's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=95.71885714285716) [the payload. The return value is the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=97.95750000000001) [messageId. Let's go ahead and try and pull](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=101.61149999999998) [from this topic using the gcloud pubsub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=103.71677777777776) [subscriptions pull. Remember that we have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=106.97271428571432) [two subscriptions on that topic, so let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=109.01785714285712) [pull first from spikey\_bugs\_dev\_sub. And](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=110.96414285714286) [we do indeed get our message. If we now](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=113.11766666666666) [try and rerun a pull from the same](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=117.40511111111113) [subscription, we get 0 results. Remember,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=120.45488888888886) [that's because each subscription is going](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=122.8772) [to store a copy of each message until at](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=125.33999999999999) [least one subscriber has acknowledged.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=128.39014285714288) [Let's now go ahead and pull from the other](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=131.133) [subscription, that's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=132.873) [spikey\_bugs\_reports\_sub, and this time we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=135.07433333333336) [do indeed get the message back the first](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=137.14388888888885) [time around. Because we have auto-ack](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=139.801) [turned on, if we pull again, this time we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=141.86800000000005) [will get 0 items returned. Because we are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=145.3685) [pulling with auto-ack turned on, each pull](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=148.61842857142855) [is effectively causing the underlying](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=151.1538571428571) [message to be removed from the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=153.29585714285716) [subscription queue. Let's go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=154.957) [publish yet another message on the same](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=158.278) [topic, spikey\_bugs. This one has to do](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=160.358) [with an incorrect URL on a payment](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=162.978) [gateway. And this time, let's try](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=166.49724999999995) [something different. Let's go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=168.57357142857137) [pull from our spikey\_bugs\_dev\_sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=170.6384285714286) [subscription, but this time we omit the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=172.4965) [auto-ack flag. So we are explicitly not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=176.52099999999996)[acknowledging the receipt of the message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=179.5624285714286) [that we just pulled. When we run this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=181.9625) [command, the output is going to look a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=184.25450000000004) [little different. It has an additional](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=185.96300000000002) [column called ACK\_ID. This is the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=188.36471428571426) [acknowledgment ID that we are going to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=190.54175000000004) [need in order to tell Pub/Sub that we did](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=192.24855555555553) [indeed receive this message. If we never](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=194.84699999999998) [acknowledge this message, Pub/Sub will](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=197.40300000000002) [keep retrying because this is, after all,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=199.13157142857142) [a reliable message store. We will](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=202.407)[acknowledge this receipt in a moment, but](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=204.91757142857145) [before that, let's go ahead and rerun the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=206.51325000000003) [same pull, and, as expected, the message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=208.77785714285713) [appears again. This will keep happening.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=212.48) [The only way we can get Pub/Sub to remove](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=214.855) [this message is by explicitly](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=216.911) [acknowledging that we have pulled it. And](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=219.5843333333334) [for that, we have to run a new command.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=221.5243) [This is gcloud pubsub subscriptions ack](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=223.768) [followed by the name of our subscription](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=227.539) [and the acknowledgment ID. We run this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=229.883) [command, and Pub/Sub tells us that we have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=233.314375) [been successful in acknowledging the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=235.30999999999997) [message. If we now go ahead and try to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=237.27400000000003) [pull from this subscription, we will find](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=239.535) [that 0 items are returned. This might take](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=241.80100000000002) [a minute or so to happen because the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=244.46099999999996) [publisher needs to get that acknowledgment](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=246.654) [and update the state of the message queues](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=248.892) [in its subscriptions. But if we run this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=251.632) [command after a minute, indeed 0 items are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=254.25366666666667)[returned. That's because we had](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=257.07899999999995) [acknowledged the receipt of the message.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=258.6196666666666) [Let's run through various other commands](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=262.005) [really quickly. It's possible to list out](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=263.865) [all of the topics in a project. So here we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=265.865) [have two, sale\_day\_offers and spikey\_bugs.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=269.4477499999999) [It's also possible to list out all of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=271.819) [subscriptions in a project. We use the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=273.483) [command gcloud pubsub subscriptions list.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=276.3005) [We can also list all of the subscriptions](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=278.41499999999996) [on a given topic using gcloud pubsub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=281.71062500000005)[topics list-subscriptions followed by the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=284.84) [name of the topic. And in this way, we can](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=287.9218571428572) [see that spikey\_bugs has got two](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=290.4959999999999) [subscriptions. Let's now go ahead and see](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=293.11500000000007) [how to delete one of these subscriptions.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=294.92899999999986) [It's simple enough, gcloud pubsub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=296.693) [subscriptions delete. Next, let's go ahead](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=299.355) [and list the topics in our project and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=302.2909999999999) [then pick one of them for deletion. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=304.60350000000005) [will require us to use the command gcloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=307.293) [pubsub topics delete followed by the topic](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=309.32557142857144) [name, spikey\_bugs. And this leads to an](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=313.00033333333334) [interesting question. What happens to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=316.16414285714285) [subscriptions on a deleted topic? We've](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=318.07849999999996) [just deleted the topic spikey\_bugs. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=320.6243333333333) [switch back to the web console. And if we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=322.93357142857144) [look at the subscriptions on this topic,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=325.51528571428577) [we find that there it shows up as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=327.0876666666666) [deleted-topic. So deleting a topic does](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=330.78366666666665) [not automatically delete its](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=333.39814285714294) [subscriptions. That's something that we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=335.19966666666664) [can do manually. Let's go ahead and delete](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=336.97014285714283)[both of these subscriptions by selecting](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=338.87675) [them and clicking on the Delete button up](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=340.95740000000006) [top. Let's do the same with all of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=344.4361428571428) [topics. So let's switch over to the Topics](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=346.5968888888889) [tab, find the one remaining topic, which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=348.54925) [is sale\_day\_offers, and go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=350.88842857142845) [delete that one as well. At this point, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=353.3961666666666) [have successfully deleted all of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=355.87688888888897) [topics and the subscriptions that we created in the course of the demo so far.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=2&mode=live&start=357.7101428571429)

[Seek to Snapshot](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live)

[Let's move on to a really interesting](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=2.22) [demo. This one is going to demonstrate the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=4.3786249999999995) [use of the create snapshot functionality](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=6.286111111111111) [and how exactly it works when we seek to a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=8.508333333333333) [snapshot on a Pub/Sub subscription. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=11.879888888888894) [start off simple by creating a topic.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=14.895999999999999) [Let's call this topic](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=17.031) [spikey\_customer\_service. Next, let's go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=19.488599999999998) [ahead and create a subscription on this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=20.901857142857146) [topic. Let's call that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=23.539) [spikey\_customer\_service\_sub1. As its name](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=26.74875) [would suggest, we're going to create](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=28.236875000000005) [another subscription on this topic a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=29.539) [little later on in this video. Next, let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=31.423) [go ahead and publish a message on our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=34.725) [topic. This is going to be Issue 1, which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=37.2568) [says that a user can't log in from a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=40.7199) [particular location. Up to this point, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=42.735) [haven't done anything really complicated.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=46.030499999999996) [We just created a topic, created a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=47.993) [subscription, and published one message on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=50.029) [that topic. From here on in is where](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=52.337) [things get interesting. Let's start by](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=55.009)[pulling from our subscription. So we are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=58.27471428571428) [going to get this issue 1. Note that we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=61.117000000000004) [did this pull with the auto-ack flag. So](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=63.643499999999996) [at this point, our subscription queue is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=65.677) [going to be empty. Let's go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=68.67499999999998) [publish another message on our topic. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=71.57299999999998) [is Issue 2: Change of delivery address.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=73.59877777777778) [Now before pulling this message, let's go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=76.54633333333334) [ahead and create a snapshot. This is going](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=80.50300000000001) [to make use of the gcloud beta pubsub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=83.117) [snapshots create command followed by the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=86.00900000000001) [name of our snapshot and, most](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=89.15225000000001) [importantly, followed by the name of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=91.02385714285714) [subscription which we are seeking to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=93.43075) [snapshot. As discussed in the theory, this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=95.52925) [is going to cause the current state of our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=97.49750000000002) [subscription to be snapshotted, that's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=99.687) [frozen, and what's more, the following](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=102.5706)[messages as they come in are going to be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=104.923) [recorded into the snapshot as well. Before](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=108.09166666666665) [we demonstrate exactly how snapshots work,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=110.8055) [let's switch over to the web console,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=112.722625) [navigate to the Snapshots tab, and there](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=114.785) [we can see that our snapshot has indeed](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=117.22099999999999) [come into existence. Now we made the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=119.51500000000004) [comment a moment ago that a snapshot not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=122.42699999999996) [only reserves the state of a subscription](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=125.14271428571425) [at a given point in time, it also](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=127.17699999999998) [maintains a copy of the state of that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=130.05699999999993) [subscription from that point in time](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=133.03374999999994) [onwards. Let's prove that this is the case](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=136.5916) [by switching back to gcloud, and let's go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=138.41787499999995) [ahead and publish a few more messages on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=141.342) [our topic. Remember that we had published](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=143.624) [an Issue 1, then we had pulled Issue 1. We](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=146.573) [published Issue 2, and then we took the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=150.404) [snapshot. Now let's go ahead and publish](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=153.57999999999993) [Issue 3. And then without pausing for a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=156.67024999999995) [break, let's publish Issue 4 as well. If](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=158.92914285714286) [we now go ahead and pull from our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=163.21744444444442) [spikey\_customer\_service\_sub1, we will](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=165.501) [expect to pull Issues 2, 3, and 4 in no](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=168.121) [particular order. And that's exactly what](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=172.499)[happens. The next three pulls result in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=175.1235714285714) [Issues 2, 3, and 4. A fourth pull after](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=177.9026363636364) [that gives us 0 results because we have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=181.09888888888892) [successfully acknowledged all of the items](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=183.77099999999996) [in our subscription. Now, remember, the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=186.54357142857145) [point of this whole exercise was to show](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=188.71642857142854) [that snapshots maintain state, not just at](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=190.94299999999998) [a point in time, but after that point in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=193.19450000000006) [time. Let's prove this by seeking to our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=196.5748571428572) [snapshot. So we run the command gcloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=199.41349999999997) [beta pubsub subscriptions seek followed by](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=202.09799999999998) [the name of our snapshot and the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=204.49985714285714) [subscription. And the response is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=208.57780000000005) [basically telling us that our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=210.317) [subscription, that's a subscriptionId,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=212.58557142857146)[spikey\_customer\_service\_sub1, has been](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=215.58671428571435) [backed up to our snapshot, which is the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=217.0455714285714) [customer service snapshot. Now let's be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=220.28549999999998) [very precise about the exact sequence of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=222.49762499999997) [events so far. When we created the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=224.4322) [snapshot, there was only one](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=226.8298571428571) [unacknowledged message in the queue. That](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=228.69485714285713) [was for Issue 2. After that, we sent out](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=231.1938) [new messages corresponding to Issues 3 and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=234.45528571428568) [4. What we now find if we pull from the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=238.25616666666667) [subscription is that all three of these](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=240.741)[issues, that is Issue 2, Issue 3, and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=243.068) [Issue 4, all of these are replayed. These](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=246.146875) [do not get replayed in any particular](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=249.529125) [order since, of course, Pub/Sub does not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=251.357) [guarantee deterministic ordering. Our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=253.355) [snapshot has caught up with the current](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=256.30699999999996) [state, so if we now do another pull, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=258.029) [get no items returned. And in this way, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=260.9801) [have proved that the snapshot did indeed](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=264.26550000000003) [not only maintain the current state as of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=266.131) [when the snapshot was taken, it also](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=268.843) [continued to maintain the state after](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=270.691) [that. Let's now try something even more](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=273.9524285714287) [cool. Let's create a new subscription and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=276.11) [seek that new subscription to our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=278.88957142857157) [snapshot. So we go ahead and create a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=281.7696666666668) [subscription called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=283.82037499999996) [spikey\_customer\_service\_sub2. This is on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=285.995) [the same topic as the one we've been](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=288.7174) [working with all along. Now this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=290.9204) [subscription has missed all of the action](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=292.979) [on this topic so far, but we can change](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=294.50166666666667) [that. Let's switch back to the web console](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=296.5315) [and see how we can point this subscription](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=299.253375) [to the snapshot which we just took. In the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=302.383875) [web console, we can see that our topic,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=306.70033333333333)[spikey\_customer\_service, now has two](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=308.5846666666667) [subscriptions. In the Subscriptions tab,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=311.1473333333334) [we can find both of them, that's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=312.828) [spikey\_customer\_service\_sub1 and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=316.22375000000005)[spikey\_customer\_service\_sub2. Let's now](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=318.353) [click on the Snapshots pane, and there](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=320.4238571428572) [over on the extreme right, we find the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=322.96757142857143) [three vertical dots with the Apply to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=325.89175000000006) [subscription menu item. We click on that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=328.86359999999996) [menu item and get a drop-down which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=331.3715555555556) [prompts us for the subscription that we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=332.97600000000006) [want to associate with this snapshot. Note](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=335.0274285714285) [how it's currently set to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=337.4669999999999) [customer\_service\_sub1. Let's change that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=340.23699999999997) [to point to customer\_service\_sub2. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=342.96285714285716) [go ahead and apply that. The effect of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=345.4481666666667) [this is going to be to replay all of this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=347.80529999999993) [action for the newly created subscription.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=351.009) [If we now go ahead and pull on this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=353.887) [customer\_service\_sub2, we will find that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=355.668) [all of the messages which were played](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=358.86) [after the creation of the snapshot or](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=360.91537500000015) [which were unacknowledged when the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=363.0292500000001) [snapshot was created, all of these](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=364.6295999999999) [messages are going to appear in the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=366.66799999999995) [subscription queue. And in this way, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=369.81039999999996) [have a nice way to replay all of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=372.0700000000001) [messages after a particular point in time](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=374.44457142857135) [for a newly created subscription. If we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=376.7259999999999) [now go ahead and try to pull again, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=380.52119999999996)[find that there's nothing left on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=382.349) [message queue. And because snapshots can](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=383.854) [become a pretty expensive resource, let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=386.486) [go ahead and delete our snapshot using gcloud beta pubsub snapshots delete.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=3&mode=live&start=388.94757142857145)

[Retain Messages and Seek to Timestamp](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live)

[Let's now get into another demo which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=2.785) [demonstrates the alternative to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=4.421) [snapshotting. Here we will turn on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=6.941) [retain acknowledged messages flag and then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=9.16357142857143) [seek to a particular timestamp instead of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=11.14685714285714) [seeking to a snapshot. Let's begin by](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=13.774833333333333) [serving the state of our system, so we run](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=16.617874999999998) [gcloud pubsub topics list. At this point,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=19.749500000000005) [we have just the one topic,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=22.391000000000002) [spikey\_customer\_service. Next, let's go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=23.737) [ahead and list all of the subscriptions in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=26.588666666666665) [this project using gcloud pubsub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=28.766333333333332) [subscriptions list. In here we see the two](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=31.575666666666667) [subscriptions we created and worked with](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=34.622999999999976) [in the previous example,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=36.14842857142857)[spikey\_customer\_service\_sub1 and sub2](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=38.071666666666665) [respectively. Now remember that we can](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=40.51316666666666) [only seek to a timestamp if we have turned](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=42.894777777777776) [on the retain acknowledged messages flag,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=45.911833333333334) [and that's why we have to update our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=48.519666666666666) [subscription, that's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=51.349) [spikey\_customer\_service\_sub1, and we add](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=53.842333333333336) [on the retain acknowledged messages flag](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=56.25814285714285) [as we see here. Let's go ahead and pull](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=58.727333333333334) [from the subscription just to ensure that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=61.56228571428571) [there's nothing in the message queue at](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=63.24299999999998) [this point. And that indeed is the case.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=65.46749999999999) [Next, let's go ahead and publish a new](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=67.955) [message on our topic,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=70.259) [spikey\_customer\_service. This is going to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=73.5038) [be Issue 5. Let's go ahead and pull from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=76.46871428571427) [the subscription. This is on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=80.30475000000001) [spikey\_customer\_service\_sub1. And as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=83.36925) [expected, we get Issue 5. Now it's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=85.06942857142857) [important to note that the meaning of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=88.121) [retain acknowledged messages flag is not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=91.17528571428572) [that the next time you go ahead and pull,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=93.58144444444444) [you'll get the same message again. That](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=96.3847142857143) [would defeat the purpose of a reliable](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=98.8015) [messaging service. And to confirm this,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=100.611) [let's go ahead and pull again. And when we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=103.185) [do so, we find that there are 0 items](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=106.3296) [returned even though we have turned on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=108.19650000000001) [retain acknowledged messages setting.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=111.507) [Where that setting really comes in handy](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=113.487) [is when we want to seek to a particular](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=115.40850000000002) [timestamp. So let's construct that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=119.11944444444443) [timestamp and save it in an environment](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=120.65185714285715) [variable called TS\_FORMAT. Notice how we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=123.859) [make use of environment variables such as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=126.46042857142857) [%Y, %m, and so on, which are available to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=128.81574999999998) [us in any UNIX shell. Once we have this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=132.82922222222223) [environment variable configured, let's go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=136.183) [ahead and seek to this timestamp using the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=137.742) [gcloud beta pubsub subscriptions seek](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=141.413)[command. And at the very end, we specify](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=145.1076666666667) [the time that we are seeking to. Notice](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=147.58544444444442) [how we are seeking back to 10 minutes](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=150.27625) [before the current time in this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=152.92075) [subscription. The effect of this command](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=155.63125000000002) [is going to be to replay all messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=156.99411111111118) [received in the last 10 minutes.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=159.15500000000003) [Equivalently, this is going to mark all](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=161.42585714285713) [messages received in the last 10 minutes](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=164.129) [as unacknowledged. If we then go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=166.814) [pull on the subscription, any messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=169.74066666666658) [which were received in the last 10 minutes](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=171.5088) [will appear once again even if we have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=173.85075000000006) [already acknowledged them. So let's go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=176.33728571428568) [ahead and confirm that by pulling on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=179.00928571428565) [subscription. And as we expect, we find](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=182.57499999999993) [Issue 5 appears once again. We've caught](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=185.0223333333333) [up with the message queue, and if we try](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=187.0487142857143) [and pull again, 0 items are returned. Now](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=189.14175) [let's go ahead and demonstrate yet another](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=192.88357142857143) [cool functionality of seeking to a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=194.889) [timestamp. We will show how seeking to a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=197.54100000000005) [timestamp in the future will cause a whole](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=199.40011111111107) [bunch of messages to be marked as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=201.69649999999996) [acknowledged, that is, to be effectively](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=204.45366666666663) [ignored. Let's try this out by publishing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=207.30400000000003) [a whole bunch of messages on our topic. So](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=209.10525000000007) [we'll now publish messages for Issues 6,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=212.423875) [7, and 8. Before we pull any of these](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=215.517) [messages, let's go ahead and seek to a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=219.413) [timestamp in the future. Notice how this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=222.329) [time, the seek is to 10 minutes greater](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=225.49400000000003) [than the current time. The effect of this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=228.20633333333333) [is going to be to mark every message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=231.40939999999995) [currently in the queue as acknowledged,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=233.24214285714285) [and all messages that are going to be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=235.61599999999999) [received in the next 10 minutes will be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=238.60366666666667) [marked as acknowledged as well. So if we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=240.91214285714284) [now try and pull, we will find that we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=243.91120000000004) [have nothing on the message queue. We have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=246.44100000000003)[successfully seeked or sought to a point](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=249.12525000000002) [in the future and bypassed a whole bunch of published messages.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=4&mode=live&start=250.82637499999998)

[Using a Cloud Function as a Webhook Endpoint](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live)

[So far we've been working with pull](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=2.317) [subscriptions. Let's now turn our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=4.638374999999999) [attention to the other type, that is, to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=5.843000000000001) [the push subscriptions. Here we are going](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=8.800571428571429) [to make use of Cloud Functions to create](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=11.142666666666667) [the HTTP endpoint, which is going to be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=13.762500000000003) [invoked when messages come in on our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=16.560875) [subscription. Before we get there, let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=19.2024) [go ahead and create a new topic. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=20.520000000000003) [topic is going to be called issue\_tracker,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=22.657999999999998) [and we will end with a push subscription,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=24.999)[which is going to go ahead and write a new](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=27.575000000000003) [line to a Google Cloud Storage bucket each](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=30.382199999999994) [time a new issue is raised and a message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=32.722500000000004) [raised on this topic. Let's now switch](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=36.25733333333333) [over and enable the APIs and services](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=38.99275) [required for us to work with Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=41) [Functions. So we click on the Enable APIs](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=43.132000000000005) [and Services button. We search for Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=46.73250000000001) [Functions in the API library search bar](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=49.11) [there, and then go ahead and select it and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=51.203625) [click on Enable. This is an essential](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=55.08657142857144) [prerequisite before we can work with Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=57.96085714285714) [Functions. Once this is done, we can go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=60.806799999999996) [into the Products and Services menu, find](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=62.87355555555557) [Cloud Functions, and create our first](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=65.01116666666668) [function. Now it turns out that we are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=68.37983333333334) [going to have to jump through a few hoops](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=70.0136) [in order to verify our Cloud Functions and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=71.962) [make sure that Pub/Sub can access it, so](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=74.65885714285712) [let's go ahead and see how that happens.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=77.19400000000005) [We've named our function](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=79.964) [spikey\_issues\_logs. And other than that,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=82.33839999999998) [we are fine to go with the defaults. We'll](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=83.70000000000002) [go with 256 MB, and we'll use the inline](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=86.12357142857144) [editor. Now the default runtime is Node.js](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=90.27483333333336) [6, but we can change that by clicking on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=92.72714285714282) [the drop-down there. Let's go with Python](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=94.70644444444443) [3.7 instead. The code dialog down below](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=98.35925000000002) [comes pre-populated with a hello\_world](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=101.18799999999999) [function. Let's expand that and very](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=103.37360000000001) [quickly read what this function is all](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=105.59957142857142) [about. This function is going to take in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=108.30833333333334) [an HTTP request and return a simple](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=110.36333333333334) [response. That response depends on whether](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=113.62183333333331) [there is a field called message in the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=115.54962499999999) [request arguments. If there is a field](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=118.79128571428573) [called message in the request\_json, then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=120.91399999999997) [the response is going to be that message.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=122.5562857142857) [Otherwise, it's going to be the string](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=125.16071428571428) [Hello World! There is also another file](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=127.73540000000001) [called requirements.txt, which we can use](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=130.0521666666667) [to specify any packages which our code is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=132.27933333333328) [going to require. All of this seems simple](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=135.08)[enough. Let's go ahead and hit OK. We'll](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=137.72177777777787) [get our entry point as the hello\_world](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=140.9422857142857) [function right above and create our first](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=143.0715) [Cloud Functions. Now in order to find the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=146.674) [URL which we can hit this Cloud Functions](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=149.42379999999997) [at, we can click on the function named and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=151.31850000000003) [navigate into the section called Trigger.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=153.79937500000005)[This is an HTTP-triggered Cloud Functions,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=156.233) [and so we can simply copy the URL](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=158.772) [specified there. Let's just go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=161.54800000000006) [see what happens if we use this URL as is.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=163.21422222222228) [So let's switch from Cloud Functions back](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=166.505) [to Pub/Sub and click on the Create](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=168.366) [subscription button up top. We are going](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=170.613) [to try and create a push subscription.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=173.4896) [Let's copy in here the URL of our Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=175.766) [Functions and hit Create. And,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=178.215) [unfortunately, Pub/Sub throws an error.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=181.928) [The error thrown is INVALID\_ARGUMENT, and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=184.868) [this is because Pub/Sub has no way of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=187.48277777777778) [knowing that we actually own this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=189.521) [particular URL. It's important for Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=191.683) [to throw this error. Otherwise, all kinds](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=194.514) [of folks trying to engineer](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=197.146) [denial-of-service attacks could easily](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=198.61) [just create a Pub/Sub topic and go ahead](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=200.70119999999997) [and slam a URL that they wanted to take](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=203.32575000000003) [down. We need to demonstrate ownership of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=206.9335555555556) [this particular URL. And one way of doing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=208.9378571428571)[that is via something called the Google](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=211.79300000000003) [Search Console. This is a URL which you](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=214.8209999999999) [can see highlighted on screen now. Here](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=217.13233333333335) [Google allows us to specify the exact URL](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=219.105) [of our site and go ahead and click on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=221.87211111111117) [Add Property button. Google then gives us](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=225.751) [a choice of different ways in which we can](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=228.03) [verify ownership of this URL. And the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=230.47887499999996) [default for a static URL is to upload an](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=232.6212222222222) [HTML file to that website. Now that isn't](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=235.9606666666666) [going to work so well for our Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=238.57933333333332) [Functions, so we change the method. We are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=240.27349999999998) [going to go ahead and include an HTML tag.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=242.67600000000002) [This is going to be a meta tag, which we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=244.69160000000002) [are going to add into the response from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=247.86533333333335) [our Cloud Functions. So we copy the exact](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=249.8535) [snippet of HTML with the meta tag, and we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=252.30111111111108) [are going to go ahead and switch over to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=254.75249999999994) [the Cloud Functions and paste this into](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=257.47249999999997) [the response. So instead of just returning](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=260.55420000000004) [Hello World!, we return instead a little](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=263.5330000000001) [snippet of HTML which has our meta tag](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=266.0630000000001) [embedded within it. Once this is done, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=269.1890000000001) [go ahead and save our Cloud Functions, and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=271.5980000000001) [we go back to the Verify ownership page](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=273.85324999999995) [and click on that Verify ownership button.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=276.711) [This Google Search Console is now going to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=280.598) [go ahead and hit our URL and check whether](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=282.848) [the meta tag shows up in there. The first](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=285.691) [time we try, there is a failure, but](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=288.73833333333334) [that's fine. It's just because it takes a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=290.8007142857143) [little while for our Cloud Functions to go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=292.46785714285716) [ahead and get deployed. So let's try](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=295.0161428571428) [again, and very quickly we see a welcome](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=297.6141428571429) [green message telling us that our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=300.0895000000001) [ownership was indeed verified. We are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=302.275) [almost there. Once we have registered and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=304.79071428571433) [verified our ownership on the Google](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=306.77766666666673) [Search Console, we have to do one](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=308.97999999999996)[additional step from within the Google](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=311.099) [Cloud console itself. So we navigate into](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=313.067) [the APIs and Services section and click](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=316.4105) [there on Credentials. Once we are in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=319.4770000000001) [there, we click on the Domain verification](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=321.4934444444444) [section. There we are prompted for a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=323.9456666666666) [domain to add, and here we paste in our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=327.12800000000004) [Cloud Functions URL. And the fine print up](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=330.7630000000001) [above tells us that we need to verify](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=333.0558888888889) [domain ownership here in order to allow](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=335.41200000000003) [webhook notifications to be sent to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=337.9987142857142)[external domains. This dialog also tells](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=340.6365) [us that our site must already be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=342.716) [registered on the Google Search Console,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=344.63114285714283) [which is the step we finished a moment](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=346.6011428571428) [ago. We can now go ahead and configure our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=350.087) [Cloud Functions as the endpoint of our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=352.9681111111111) [Pub/Sub push subscription. 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We](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=362.9450000000001) [click on Create, and our first push](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=366.67812499999997)[subscription has indeed come into](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=5&mode=live&start=369.08) [existence. 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So we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=5.425) [are going to click on our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=8.41425)[spikey\_issues\_logs Cloud Functions, click](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=9.318) [on the Edit button, and change the code so](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=12.588375) [that it writes out a new line into a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=15.339799999999999) [Google Cloud Storage bucket each time a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=18.61225) [message is published on the topic. So](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=20.805) [we'll select the existing code of our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=24.290375) [Cloud Function and replace it with this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=26.015) [new code. Let's walk through this code](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=28.543) [line by line. We start with a bunch of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=30.597) [import statements of which the only](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=32.681) [important one is our import of Google](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=34.799)[Cloud Storage, so we import the storage](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=37.48000000000002) [module from the Google Cloud client](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=40.5347142857143) [library. Then we instantiate a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=43.585) [storage\_client, and we define a variable](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=46.14679999999999) [with the name of our bucket, that is,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=47.732555555555564) [spikey-data-store. Please note we have yet](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=51.57780000000001) [to create this bucket. We're going to do](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=53.52400000000001) [that in just a little bit. Next, we have a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=55.29439999999999) [method called write\_issue\_to\_storage. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=58.5122857142857) [accepts the HTTP request, extracts its](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=60.46757142857143) [JSON, checks for a field called message,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=63.189)[and if such a field is present, it](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=67.02) [extracts the data from that message. It](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=68.87511111111111) [gets hold of a handle to our Cloud Storage](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=71.94155555555555) [bucket, and then goes ahead and creates a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=73.82542857142857) [blob object, which represents the file](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=76.6982857142857) [issues.txt inside the folder](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=79.54266666666666) [Tracked\_issues. It checks whether this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=82.79733333333331) [file exists, and, if so, it goes ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=84.6904285714286) [downloads it to a local file. Notice that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=87.03180000000003) [this local file is in the /tmp directory,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=89.58499999999998) [and this has all been executed inside our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=92.64500000000002) [Cloud Functions. Our Cloud Functions then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=96.221) [opens this temporary file in append mode,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=98.40766666666667) [and it goes ahead and writes out one](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=101.189) [additional line over the end of this file.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=104.41900000000003)[That additional line consists of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=107.761) [received\_message, which we just extracted](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=109.529) [from the request\_json. And then we go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=111.737) [ahead and upload this updated file back to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=114.46200000000002) [the same location in our Cloud Storage](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=117.062) [bucket. This is why it was so helpful to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=119.90700000000001) [have a handle to that location in our blob](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=121.78419999999997)[object variable. Once all of this is done,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=125.48877777777777) [we go ahead and return. This is the HTTP](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=128.17063636363633) [response, Google will periodically](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=130.98757142857144) [re-verify our domain verification, so](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=132.625) [let's make sure to leave the meta tag in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=135.07328571428573) [there. That does it for the code. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=137.93499999999997) [switch from main.py to the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=139.76433333333333) [requirements.txt file. Here we have just](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=141.691) [the one important requirement, which is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=145.3641428571428) [the google-cloud-storage client library.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=147.21975000000003) [We hit OK, and then we have to change the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=150.228) [entry point of our Cloud Functions from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=152.399) [hello-world to this write\_issue\_to\_storage](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=154.355) [function. Once that's done, we can save](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=157.99499999999998) [our Cloud Functions, and this is going to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=160.29849999999996) [get deployed on the cloud. Let's not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=162.2921428571428) [forget to create the Cloud Storage bucket](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=164.8407142857143) [which we referenced from this code, so we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=166.80566666666664) [navigate into the Storage section of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=169.43649999999997) [Navigation menu, click on Browser, and go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=171.617) [ahead and create a bucket. That bucket](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=173.958875) [needs to be called spikey-data-store.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=176.8782857142857) [That's the GCS location referenced by our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=179.369) [Python Cloud Functions. So let's hit](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=181.514) [Create, and then let's go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=184.29500000000002) [trigger our Cloud Functions and give it a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=186.70185714285716) [spin. We make use of the testing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=189.26610000000002) [functionality within Cloud Functions and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=190.951) [go ahead and trigger a simple event. In](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=193.05599999999995) [the request\_json, we do indeed have a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=196.624) [message tag. Embedded within the message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=198.822) [is a field called data. Now one](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=201.427) [interesting note about the data that you](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=204.28728571428573) [see in here. If you're wondering why it](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=206.24720000000002) [looks also funny, that's because it's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=208.33314285714292) [Base64 encoded. Pub/Sub is going to go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=211.322) [ahead and send messages into our Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=213.992) [Functions in Base64 encoded format, and so](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=216.59842857142863) [we've done the same here as well. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=219.16899999999995) [data is a Base64 encoded version of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=222.0365) [message, Hello Pub/Sub, here is my](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=225.38780000000003) [message. We click on the blue button to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=228.28299999999996) [test the function, and the output appears](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=230.1127777777777) [down below. We can see here that we have a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=232.87928571428571) [snippet of HTML, which does include the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=235.23459999999992) [meta tag that we have embedded in the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=237.29000000000005) [response. More importantly, if we switch](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=240.4913333333333)[over to Cloud Storage and refresh our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=242.2641428571429) [spikey-data-store bucket, we can see that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=244.55) [a new subfolder there called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=246.80085714285718) [Tracked\_issues has come into existence. If](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=249.48880000000003) [we click through, we find the issues.txt](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=252.649875) [file has been created as well. We click](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=254.987) [through on it and satisfy ourselves that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=257.8278571428571) [our Base64 encoded message was indeed](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=260.01099999999997) [picked up, so the test run of our Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=262.63588888888887) [Functions was successful. Let's switch now](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=265.61639999999994) [to Pub/Sub and publish a whole bunch of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=267.7845) [messages. So we click on the Publish](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=270.3685) [Message button, and very quickly print out](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=272.4470000000001) [Issue 6, Issue 7, and then Issue 8. We've](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=275.240857142857) [published three messages on our favorite](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=279.8113333333333) [topic, which is named issue\_tracker. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=281.64666666666665) [topic had a push subscription, which was](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=285.0201666666667) [connected up in turn to our Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=288.08419999999995)[Functions. To test if that Cloud Functions](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=290.8428999999998) [has worked successfully, let's switch to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=292.46999999999986) [the Google Cloud Storage bucket and open](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=294.1909999999999) [up the issues.txt file. And indeed, the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=296.44457142857135) [browser tells us that Issues 6, 7, and 8](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=300.2798333333333) [do indeed appear in our file. So our push](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=303.8181999999998) [subscription has worked. We have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=307.259) [successfully written to a cloud storage](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=309.2374285714286) [bucket using a Pub/Sub subscription. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=311.39716666666664) [be good citizens and clean up all of our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=315.2845555555555) [state starting by deleting our Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=317.40175)[Functions. Once that's done, let's shift](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=320.1902499999999) [to Pub/Sub and delete the topic, that's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=322.0578571428571) [the issue\_tracker. After deleting the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=325.7218571428573) [topic, let's also go ahead and delete the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=327.7245714285715) [one subscription that we have at this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=329.92742857142866) [point. Notice that deleting the Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=332.5508) [Functions has not caused the corresponding push subscription to be deleted.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=6&mode=live&start=334.4606666666667)

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[This gets us to the end of this module, so](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=1.902) [let's summarize some of what we've just](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=4.167333333333334) [learned. This was a demo-filled module in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=6.1646666666666645) [which we saw how publishers publish to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=7.878750000000001) [topics, subscribers in turn listen in on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=10.547499999999998) [subscriptions, subscriptions are wired to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=13.077) [listen in on those topics. Topics and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=16.3)[subscriptions are both GCP resources.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=19.722428571428573) [We've worked with both push and pull](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=22.376) [subscriptions, and we also demonstrated](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=24.068) [some really cool features which have been](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=26.206) [newly added to Pub/Sub, notably the seek](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=28.175) [to timestamp and seek to snapshot](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=31.045) [functionality. So far all of our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=34.3425) [interactions with Pub/Sub were either](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=36.705) [through the gcloud command line utility or](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=38.42114285714286) [the web console. In the module coming up](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=40.799600000000005) [ahead, we will start programmatically](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=43.171124999999996)[working with Pub/Sub using client libraries.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=012a50d4-eea5-4511-9730-bc33faac1436&clip=7&mode=live&start=44.827)

[Using the Cloud Pub/Sub Client Library](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live)

[Module Overview](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live)

[Hello, and welcome to this module on Using](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=0) [the Cloud Pub/Sub Client Library. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=5.271) [module is going to be all about Python](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=8.343666666666666) [code and programmatic access to Pub/Sub.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=10.133) [We will start by installing the Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=13.733) [client library and then working with it in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=15.441) [different ways. We will construct a simple](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=17.963)[publisher and a simple subscriber and then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=20.146) [go ahead and tweak both the publisher and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=22.884) [the subscriber to add various additional](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=25.285) [functionality such as asynchronous and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=27.485) [batch message publishing, which are both](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=29.805) [ways to make the publisher more efficient.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=32.177) [On the subscriber side, we'll configure](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=34.404)[flow control. This is a way of ensuring](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=35.881) [that a slow subscriber does not fall too](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=38.184) [far behind and that it's not overwhelmed](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=41.217) [by a very active publisher. And we'll](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=43.436) [round out the course with a substantial](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=46.67100000000001) [piece of code. This is a Google Hangouts](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=48.56875) [chatbot that's going to be wired up and work with Pub/Sub in the backend.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=0&mode=live&start=51.99328571428572)

[Creating a Service Account to Use Client Libraries](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live)

[Let's plunge right into a simple demo](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=2.288) [which shows how we install the Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=4.359125) [client libraries. And after that, we'll go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=7.93625) [ahead and code up a simple publisher and a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=9.953333333333333) [simple subscriber both in Python. Now it's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=12.486285714285717) [actually kind of convenient and cool to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=15.679428571428573) [have the publisher and the subscriber both](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=17.423428571428573) [in two terminal windows juxtaposed. And](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=19.87) [that's why we are not going to use](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=23.2489) [Datalab. We will do all of this Python](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=25.120099999999987) [coding from Cloud Shell. And anytime we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=26.934444444444452) [are writing Python code from Cloud Shell,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=28.883142857142854) [we need to define a service account to do](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=30.846374999999995) [so. So we click through into the IAM and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=33.900428571428556) [admin section, navigate to Service](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=36.1672222222222) [accounts, and go ahead and create a new](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=38.347199999999994) [service account by clicking on the button](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=40.71599999999999) [right up top. Let's give this service](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=43.26233333333333)[account a descriptive name. We'll call](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=45.353) [this spikey-ps-service, give it a short](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=47.40980000000001) [description, and then hit Create. Next,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=50.978) [we've got to assign some roles to the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=54.72544444444445) [service account. To keep things simple,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=56.489) [let's just go ahead and give it project](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=58.785) [owner access. This is a very high level of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=60.625) [access. If you are doing this in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=64.0594) [production, you'd probably look for some](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=65.68985714285716) [curated set of specific roles for Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=67.49174999999997) [and only go ahead and assign those. Once](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=70.19828571428572) [that's done, we hit Continue, and then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=73.156875) [we've got to create the credentials. So we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=74.976) [click on the Create Key button down below.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=78.29279999999999) [We want the key to be of type JSON. That's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=80.908) [what's recommended. And then we click](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=84.86333333333333) [Create. The credentials come into](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=87.38039999999998) [existence, and we then go ahead and save](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=88.82685714285715) [this private key to our local computer.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=91.10211111111113) [The reason we are doing this is that in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=93.43042857142856) [just a moment, we are going to upload this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=95.90299999999996) [file from our local machine into the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=97.931)[ephemeral Cloud Shell VM. So we take note](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=100.75157142857142) [of the local file, spikey- ps.json, and we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=104.05300000000001) [are basically done with the service](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=106.80414285714284) [account creation. Let's open up Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=109.96700000000001) [Shell by clicking on the icon over on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=112.1335) [top right. Once that's done, let's go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=115.39171428571426) [ahead and upload our key file. There's a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=117.75700000000003) [simple enough way to do this. We wait for](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=120.47737500000001) [the terminal window to open up, and we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=122.80949999999997) [click on those three vertical dots at the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=124.7463333333333) [top of the terminal window, and we select](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=126.67137500000001)[the Upload file option. We then navigate](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=128.9312857142857) [to wherever we had downloaded the key file](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=131.3141428571429) [on our local machine. And this now gets](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=134.34980000000002) [uploaded into the Cloud Shell VM. So this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=137.073) [is effectively our home directory on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=139.76900000000003) [Google Cloud Platform. We can find it](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=142.8635) [there by running ls -n spikey- ps.json.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=145.64466666666664) [The next step is to make sure that the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=147.82425) [environment variable,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=151.0434) [GOOGLE\_APPLICATION\_CREDENTIALS, points to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=151.867) [this particular key file. This is a way of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=154.691)[ensuring that any code that we run from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=157.73411111111105) [this Cloud Shell window is going to make](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=159.6025555555556) [use of this service account. We now have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=162.18575) [our credentials set up correctly. We can](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=165.32024999999996) [go on and upgrade our version of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=167.3632) [Google Cloud Pub/Sub client library. For](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=169.18) [this, we make use of the sudo pip install](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=173.22366666666667)[command with the upgrade flag followed by](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=175.27033333333333) [the name of the module. That runs through](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=177.94557142857144) [successfully, and we are now in business.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=180.92957142857145) [Before we plunge into our Python coding,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=182.91000000000003) [let's go ahead and create a topic called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=184.955) [spikey\_bug\_report. This is a topic which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=188.76966666666667) [we are going to use throughout this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=190.47549999999995) [module. Next, let's go ahead and create a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=192.07299999999998) [simple pull subscription on the topic that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=194.39137500000007) [we just created. That topic was called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=197.51966666666672) [spikey\_bug\_report, and our simple](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=200.8882) [subscription is called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=202.31349999999998) [spikey\_bug\_report\_sub. Now we're ready to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=203.255) [start with our Python coding, so let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=207.527) [launch the code editor by clicking on that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=209.578) [little pencil icon over the top of our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=212.12114285714284) [Cloud Shell window. In case you have not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=215.17600000000002) [used the code editor, it's a handy way to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=217.7123333333334) [navigate your file system on your GCP home](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=219.90737500000003) [directory. We create a directory called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=223.10450000000003) [pubsub\_python\_files. Within that, let's go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=226.55533333333335) [ahead and create a new file called spikey\_publisher.py.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=1&mode=live&start=228.08300000000003)

[Implementing a Simple Publisher and Subscriber in Python](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live)

[This is going to be our publishing code.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=2.16) [We start by importing the Google Cloud](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=4.372) [Pub/Sub library. Notice that we import a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=6.788) [specific module, that's pubsub\_v1. Next,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=9.596) [let's define variables with our project\_id](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=13.642166666666666) [and our topic\_name. We then instantiate](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=15.847) [the PublisherClient and store that object](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=19.678000000000004) [in a variable called publisher. We also](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=22.639749999999996) [have a topic\_path, which we get from the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=25.613999999999997) [same publisher object. While getting hold](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=28.224000000000004) [of the topic\_path, we need to specify the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=30.858999999999998) [project\_id, as well as the topic\_name](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=33.22624999999999) [because, of course, both of those are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=35.0415) [required to fully qualify our topic name.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=37.079714285714296) [Then we have a simple for loop in which we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=39.414) [go ahead and print out 10 messages. Each](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=41.83) [one of these has data of the form Bug](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=45.08622222222222) [Reported Url followed by a nicely](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=48.59228571428571)[formatted integer. That data is then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=51.186) [encoded in UTF-8 format. Next comes the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=53.632) [most interesting line of code in the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=57.994285714285716) [program. This is our invocation of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=59.766857142857134) [publisher.publish method. Notice that we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=62.90459999999999) [have to specify the topic\_path, as well as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=64.77314285714287) [the data. But what's really interesting](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=67.81333333333333) [about this method is the return value,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=70.18933333333337) [which is of type future. If you have not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=72.28300000000002) [encountered objects of type future in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=75.83714285714288) [Python or in Java, these are a standard](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=77.93199999999999) [way, a standard interface used to obtain](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=80.75137500000001) [the results of an asynchronous operation.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=83.1715) [When we have the result of a future's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=87.447) [object, we can choose to either wait, that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=89.481) [is, block on it until the result comes](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=92.412) [back, or to attach a callback function,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=94.484) [which will handle the result](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=97.622) [asynchronously. In this example, we go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=100.53616666666665) [with the blocking call to future.result,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=102.24337499999999) [and we print the results out to screen. In](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=104.1514285714286) [the next example, we will specify a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=108.35074999999999) [callback handler. That does it for the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=109.938) [publisher. Let's go ahead and create a new](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=113.109875) [file, this time for the subscriber. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=115.45037500000004) [file starts out in a very similar fashion.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=118.75733333333334) [We import the Google Cloud Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=121.488) [library, version 1. We then specify the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=124.0191428571429) [project\_id. This time it's the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=127.30814285714288) [subscription\_name that we have to specify](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=129.49133333333333) [rather than the topic\_name which we had in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=131.28057142857148) [the publisher. Next, we go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=134.4594285714285) [instantiate the SubscriberClient, and we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=136.90857142857138) [also need to get a path to the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=138.61099999999996)[subscription. As before, this needs to be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=141.71049999999997) [fully qualified using the project\_id, as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=143.9579999999999) [well as the subscription\_name. Next, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=145.5888571428572) [define our simple callback function. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=147.87160000000003) [is simply going to print out the message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=151.589) [that was received and then invoke the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=153.2657142857143) [acknowledge method on the message. Now if](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=155.869) [you're wondering how we know when to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=159.56199999999998) [invoke this callback message, the answer](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=161.13) [is we don't. All we can do is pass in this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=163.33885714285714) [particular callback method into our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=166.876) [subscribe method. This way every time a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=169.068) [message is published on our subscription,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=172.413) [the callback is going to be invoked. So](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=175.202) [this is the most important line of code in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=178.0268888888889) [the subscriber. We invoke the subscribe](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=180.02985714285714) [method on our subscriber client and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=181.973) [specify the callback method that we want](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=184.57357142857148)[invoked whenever a message comes in. And](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=187.49699999999996) [we need to then create an infinite loop.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=190.54733333333334) [This loop is just going to sleep and wait](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=193.238) [for messages to come in and invoke our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=195.26) [callback. We are done coding up both the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=198.4422222222222) [subscriber and the publisher, so let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=200.54187499999995) [exit out of the code editor, cd into our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=201.8555555555556) [directory which contains all of these](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=204.6798571428571) [files, and run the ls command to ensure](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=206.7847777777778) [that they are all in there. Now because we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=209.496) [have a subscriber and a publisher, let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=212.248) [open up a second Cloud Shell window. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=213.848) [export our application credentials as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=216.51800000000003) [before. And let's also make sure that we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=218.56971428571427) [have the latest version of Pub/Sub. It's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=221.68399999999997) [important to do this for each Cloud Shell](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=224.215) [window where we are running our client](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=225.94685714285714) [because there's no guarantee that all of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=227.79666666666668)[these are running on the same underlying](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=229.817) [VM. In any case, once we have all of our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=231.5025) [Cloud Shell windows lined up, we can run](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=235.44437500000004) [the publisher in one window and the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=237.82066666666663) [subscriber in the other. So let's switch](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=240.0306) [to the publisher window. And there we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=242.71014285714287) [invoke Python followed by the name of our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=244.903875)[publisher file. This is going to go ahead](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=247.76559999999998) [and publish 10 messages on the topic. If](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=249.79000000000008) [we switch to the subscriber and kick off](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=252.86244444444444) [the client, that in turn is going to go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=254.578) [ahead and receive all of those messages.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=256.796) [And we can confirm that that's the case](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=259.533) [because all 10 of those messages are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=261.175) [indeed printed in the form that we had in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=263.37825000000004) [our callback function. At this point, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=266.077) [can go ahead and kill the client and end the infinite loop that we had in there.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=2&mode=live&start=268.625)

[Asynchronous Publishing Using Callbacks](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live)

[Let's now tweak our publisher and make it](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=2.34) [a little more efficient so that it's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=4.063555555555556) [publishing asynchronously using callbacks.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=6.799) [Recall that in the previous example, our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=10.175) [publisher would actually wait on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=12.49242857142857) [result of the future object. That's not a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=14.349) [terribly efficient way of sending out](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=16.922142857142855) [messages. So let's go ahead and now create](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=19.334333333333333) [a new publisher. Let's call this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=22.024799999999995) [spikey\_publisher\_callback.py. A lot of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=25.743000000000002) [code here is similar to what we just saw,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=27.566200000000006) [so we won't dwell on it. Where things get](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=29.717333333333332) [different is in this method called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=32.09642857142857) [callback. Notice that it takes in an](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=34.23433333333334) [argument called a message\_future. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=36.37699999999999)[represents the future object which is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=38.528999999999996) [returned when we invoke the publish method](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=40.937571428571424) [on our publisher. The body of this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=43.99128571428572) [callback function doesn't do a whole lot.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=46.59700000000001) [It basically waits for our future object](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=48.84322222222223) [to conclude successfully, and then it](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=51.803399999999996) [prints out to screen the result of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=54.425999999999995) [future object, which is nothing but the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=56.86328571428572) [message ID. This callback function is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=59.175399999999996) [invoked by specifying a callback on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=61.84100000000001) [result of our future object. So the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=64.599875)[message\_future.add\_done\_callback is where](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=69.47439999999997) [this function comes into play. And that's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=71.45814285714285) [why we now no longer have a blocking call](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=74.42677777777777) [to future.results like we did in our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=76.62271428571428) [previous publisher. That was not a very](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=79.97749999999999) [efficient way of publishing messages.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=82.19737500000001) [Because we no longer have a blocking call,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=83.79400000000001) [we need to end this program with an](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=86.93111111111112) [infinite loop. Otherwise, we would end](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=89.4742) [execution before our callback was ever](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=92.03433333333331) [invoked. We are done with the publisher,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=94.84819999999998) [and there's no change to the subscriber in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=96.47524999999996) [this particular example, so we can switch](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=98.35885714285718) [back to Cloud Shell and give our new](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=100.76557142857139) [publisher a spin. Let's invoke](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=103.68140000000001) [spikey\_publisher\_callback.py, and notice](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=106.89033333333334) [how our callback method is now invoked 10](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=108.787) [times. And in each instance, it prints out](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=112.0292857142857) [the message ID. This is just a much more](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=115.19200000000001) [efficient way of publishing, which is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=117.71899999999997) [something which we'll need to do if we're](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=119.27949999999998) [doing this in production. If we now switch](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=121.82722222222223) [to the subscriber, absolutely nothing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=124.04042857142856) [changes there. Let's go ahead and run our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=125.50999999999999) [subscriber code. All of the messages get](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=128.59399999999997) [printed out to screen, and we now need to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=130.25350000000003) [terminate not one but two infinite loops,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=133.249) [so we've got to kill both the subscriber and the publisher.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=3&mode=live&start=135.7637777777778)

[Publishing and Parsing Messages with Custom Attributes](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live)

[Let's now try out another variant. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=2.231) [time we are going to publish messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=4.357374999999999) [which have custom attributes. These are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=5.879) [the same key-value pairs which we had](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=7.886) [explored using gcloud in the web console.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=9.612) [And we'll also tweak our subscriber so](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=12.286) [that it goes ahead and parses all of those](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=13.841750000000005) [custom attributes. Let's keep things](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=16.232) [systematic and create a new publisher.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=19.31785714285714) [Let's go ahead and call this one](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=21.082428571428572) [spikey\_publisher\_custom\_attributes. Much](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=24.854333333333333) [of the code is very similar to what we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=26.1186) [just saw. We have a callback function as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=28.077) [before, so this is asynchronous. And then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=30.888) [we have an infinite loop at the end. The](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=33.773799999999994) [only difference is in the actual call to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=36.2205) [publisher.publish. Here, after we specify](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=38.6738) [the topic handle, we also add in a bunch](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=41.36533333333333) [of key-value pairs. So in addition to the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=44.7495) [data, we specify a branch, which is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=47.21477777777777) [specified as data, and a username, which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=49.29237500000001) [gives the identity of a particular tester.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=52.06857142857143)[That does it on the publisher side. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=54.95614285714286) [create a new file for our subscriber and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=57.87728571428571) [create a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=60.90166666666666) [spikey\_subscriber\_custom\_attributes. Once](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=61.735) [again, this code is very similar to what](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=64.582125) [we just saw. The interesting bits appear](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=66.66485714285714) [when we make use of the message.data](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=69.192375) [invocation to get hold of the message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=71.771)[payload, and then the message.attributes](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=73.789) [property. Note how we are testing whether](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=77.52816666666666) [it's none. If our message does indeed have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=80.40824999999997) [any attributes, we go ahead and print them](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=82.66614285714289) [out using a for loop. So](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=84.98287499999996) [message.attributes takes the form of a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=88.02283333333332) [dictionary. We are iterating over all of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=90.2936666666667) [the keys in this dictionary and getting](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=91.83733333333336) [the corresponding values and then printing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=93.64019999999998) [them out to screen. Let's go ahead and try](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=95.65433333333337) [out both the publisher and the subscriber.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=98.44374999999997) [This time we will kick off the subscriber](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=100.744) [before we kick off the publisher just to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=102.742) [show that it's possible to do so. There](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=104.838) [aren't any messages yet, and that's why we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=108.17) [just get a holding message telling us that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=110.4245) [our subscriber is listening for messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=112.9902857142857) [on the subscription. Let's switch over to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=115.58075) [the publisher window and kick that off as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=118.64200000000001) [well. As before, this is making use of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=121.26933333333332) [callbacks. And so the publisher is going](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=124.04166666666666) [to print the message IDs out to screen.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=125.50666666666666) [Now if we switch back to the subscriber,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=128.174) [we can see that the attributes do appear.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=130.99) [So we have a couple of attributes for](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=133.348) [every message, the username, which could](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=134.89111111111112) [point to Tester 1 or Tester 2 and so on,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=137.02757142857143) [and then the branch, which is set to beta.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=140.36419999999993) [And we wrap things up by killing both the subscriber and the publisher.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=4&mode=live&start=144.141)

[Using Subscribers with Flow Control](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live)

[Let's add a further tweak this time on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=2.24) [subscriber side. We are going to implement](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=4.196) [something called flow control. This is a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=6.15) [way of making sure that the subscriber](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=8.422666666666666) [never pulls in a large number of messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=9.73475) [all at one go. This is something that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=12.4856) [could be useful if we have a subscriber](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=14.819500000000001) [which is very slow but a publisher which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=16.817666666666668) [is relatively fast. As usual, let's create](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=19.413499999999996) [a new file for both publisher and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=21.690555555555555) [subscriber. On the publisher side, the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=24.357666666666663) [only difference is in the number of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=26.61542857142857) [messages which we end up publishing.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=28.478888888888886) [Previously we were publishing 10. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=30.118000000000002) [time we are going to publish something](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=31.972750000000005) [like a million. Because the publisher is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=34.2384) [sending out just so much traffic, a slow](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=36.30314285714285) [subscriber would end up having a very](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=38.89514285714286) [large number of outstanding messages. It](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=40.965) [is possible that the subscriber would just](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=43.217499999999994) [be overwhelmed. And this is where flow](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=46.52300000000001) [control comes in. Let's go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=48.877999999999986)[implement a subscriber with flow control,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=50.889428571428574) [and along the way we will also simulate](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=52.673249999999996) [it's being very slow by adding in a sleep](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=55.32875000000001) [inside the callback. So here each time a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=59.17285714285714) [new message comes in, our callback](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=62.11833333333332) [function is going to sleep for 10 seconds.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=63.76124999999999) [Right after we sleep, we also print out a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=66) [new line character. This is a way of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=69.46699999999998) [indicating to the user who's monitoring](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=72.13511111111114) [the screen how long our program has been](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=73.9782857142857) [sleeping. And the next line is where it](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=76.80000000000001) [gets interesting. Note how we instantiate](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=79.07933333333338) [a flow\_control object. This is of a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=81.71285714285713) [specific type, pubsub\_v1.types](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=84.79633333333334) [.FlowControl, and we also have to specify](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=86.287) [the maximum number of messages which our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=90.03457142857141) [client can tolerate. Here we specify that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=92.23899999999999) [to be equal to five. Once we have this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=94.7062222222222) [flow\_control object, we go ahead and pass](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=97.54066666666668) [it in as an additional parameter into the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=99.186) [subscriber.subscribe method. The rest of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=102.77640000000001) [this code is as usual. There's an infinite](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=105.1435) [loop to end it out. Let's switch over to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=107.16624999999999) [the Cloud Shell window and kick off](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=109.63912499999999) [publisher and subscriber. This time our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=111.768) [publisher is going to generate an enormous](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=113.83428571428571) [number of messages. Let's turn over to the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=116.1255) [subscriber and see how that program is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=118.88362500000001) [doing. And this is interesting. We can now](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=121.1984) [see that messages are received](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=123.68312499999999) [intermittently, and the number of messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=124.88) [pulled in one go is never greater than](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=127.144) [five. We can tell that this is the case](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=130.91111111111107) [because we have those new line characters](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=132.46288888888893) [in there after every interval of waiting.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=134.50150000000002) [We have successfully demonstrated flow](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=137.784) [control because even though our publisher](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=139.856) [is printing out a million messages at high](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=142.72) [speed, our subscriber pulls them in a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=144.976) [leisurely fashion with long breaks in between.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=5&mode=live&start=147.96)

[Publishing Messages in Batches](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live)

[We'll now add a further tweak to make our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=2.745) [publisher even more efficient. This time](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=4.593) [it's going to be about publishing messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=6.7745) [in batches. We saw in the previous example](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=8.415714285714285) [how a publisher might go ahead and print a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=10.645714285714288) [million messages. The way we had set that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=13.729666666666667) [example up, each one of those was going to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=15.815000000000001) [be published individually. That is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=18.2806) [probably not a very efficient way of doing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=19.945999999999998) [things, so let's go ahead and add batch](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=22.841222222222218) [settings. So we create a new publisher](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=25.148857142857143) [called spikey\_publisher\_batch.py. As](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=29.1) [always, most of the code is the same as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=31.9805) [the previous example, but what's different](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=34.073)[here is the batch\_settings variable.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=36.129) [Notice how this object takes in two](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=39.294) [parameters, the maximum number of bytes,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=40.977) [that's 256, or the maximum latency, that's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=44.236) [10 seconds. A batch is going to be sent](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=47.35044444444444) [out as soon as either one of these is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=50.42463636363636) [reached. Depending on which one is hit](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=53.580363636363614) [first, we might trigger a batch either](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=55.45328571428573) [because of large messages or because of a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=57.3045) [long wait between messages. The rest of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=60.049499999999995) [the publisher code is very similar to the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=62.74033333333334)[previous example. The one difference is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=65.443) [that when we instantiate our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=67.835) [PublisherClient, we've got to pass the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=69.543) [batch settings in there. So this is a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=71.292)[property of the publisher itself and not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=73.84100000000002) [of any specific topic. That does it for](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=76.6852857142857) [the publisher. We also go with the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=80.28833333333336) [simplest possible version of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=81.9687142857143)[subscriber. We switch back to Cloud Shell](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=84.13925) [in order to run these programs, and there](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=85.84133333333331) [we notice something interesting. We](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=88.05057142857142) [already have a large number of messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=91.027125) [which were published in the previous](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=93.149) [example which are still lying around.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=94.893) [These are messages which were sent out by](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=97.941) [our high-speed publisher before we were](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=99.621) [able to kill it. Our subscriber in this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=101.909) [example is listening on the same topic,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=104.831) [and that's why it runs into them. How are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=107.407) [we supposed to deal with these? Well, the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=110.8915) [answer is simple. We'll just seek to a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=112.713) [timestamp in the future, and that way we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=114.50112499999997) [will be able to bypass processing all of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=116.49388888888888) [these pent-up messages. Now we have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=119.87585714285714) [discussed how to do this in some detail in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=122.29599999999998) [a previous demo, so we won't dwell on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=124.27766666666668)[this. But just know that it's a practical](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=126.10188888888888) [application of seeking to a future point](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=128.22433333333333) [in order to avoid processing unwanted](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=131.063) [messages. We then go ahead and kick off](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=133.4252857142857) [our spikey\_subscriber once again, and this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=136.821) [time the queue is clean, our subscriber is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=139.41985714285713) [listening and waiting for the publisher to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=142.07928571428573) [come online. So we switch command prompts](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=144.47419999999997) [and bring the publisher up, publish a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=146.9935) [bunch of messages, this time with the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=149.91328571428573) [batching enabled. Now in this example, our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=153.21566666666664) [publisher is only sending out very small](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=155.39525) [messages, and that's why the trigger which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=157.52200000000002) [sends the batch out has to do with](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=160.043) [latency. Every 10 seconds, a batch leaves](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=163.02060000000003) [from the publisher and is picked up in the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=165.03449999999995) [subscriber window. Once again this is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=167.437) [because our individual messages are small,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=169.898) [and so the conditions relating to the size](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=172.692) [of the messages in a batch are not](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=174.753) [triggered. Batching is a great way to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=177.62855555555558) [improve the efficiency of your publisher](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=179.08825000000007) [if it's sending out a lot of messages of significant size.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=6&mode=live&start=180.73633333333336)

[Building a Hangouts Chatbot Using Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live)

[Let's round out this course with a really](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=2.257) [meaty example. Here we will demonstrate](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=3.881) [how to build a Hangouts chatbot using](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=6.288) [Pub/Sub. Before we get to the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=9.486125000000001) [implementation, let's take a quick look at](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=11.187166666666668) [what we are going to end up with. Our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=12.539999999999996) [chatbot is going to accept user input and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=14.639333333333335) [respond based on whether that user input](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=17.494874999999997) [sounds positive or negative. So, for](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=20.296499999999995) [instance, if a user says that she had a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=22.338555555555555) [great experience but she needs help, our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=24.688000000000002)[chatbot is going to respond with a happy](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=26.864875) [greeting, something along the lines of,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=29.16583333333333) ["I'm glad you're having a good day. " So](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=31.561333333333334) [let's plunge into the implementation.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=34.33616666666667) [Let's start by creating a topic. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=36.157) [call this topic spikey\_chatbot. Next,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=38.8504) [we'll create a simple pull subscription on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=41.42066666666667) [this topic, and our chatbot is going to go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=43.73828571428571) [ahead and listen on that pull](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=46.57688888888888) [subscription. So let's call this the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=48.01914285714286) [spikey\_chatbot\_sub. And, of course, it's a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=50.276) [pull subscription. We'll go ahead and hit](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=52.962) [Create. Now the next item on the agenda is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=56.18287499999999) [to create a chatbot which can listen on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=58.1407777777778) [the subscription. And for that, we'll have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=60.77877777777778) [to start by enabling the chatbot API. So](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=62.744624999999985) [we navigate into the APIs and Services,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=66.34111111111112) [Dashboard. The first thing we do there is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=69.58288888888895) [to enable APIs and Services. That brings](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=71.37133333333337) [us to the API library where we search for](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=73.4025) [the Hangouts Chat API and then go ahead](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=76.45799999999997) [and enable that as well. We are now ready](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=79.37799999999997) [to go ahead and configure our first](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=82.2988888888889) [chatbot. So we click on the Configuration](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=84.92714285714285) [tab over on the left. We are prompted for](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=86.956) [a bot name. Let's choose Spikey\_Chatbot.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=90.0898) [We need to specify a URL with an image. We](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=93.614) [add in a little description. And then we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=97.01766666666667) [select two options. These allow our bot to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=99.876) [work both with direct messages, as well as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=102.74599999999998) [in rooms. And the next bit is important.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=105.59985714285715) [In the Connection settings, we need to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=108.212) [specify Google Cloud Pub/Sub as the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=110.09) [destination of the messages that the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=113.066) [chatbot is going to emit. Again, please](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=115.323) [note that this is the destination. This is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=118.13575)[what the chatbot is going to publish to.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=120.12200000000001) [In just a little bit, we are going to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=121.98711111111112) [create a bot.py which will separately](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=124.54614285714287) [subscribe to the same topic and parse the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=126.46914285714286) [responses. We also need to specify the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=129.7122857142857) [cloud Pub/Sub topic fully qualified with](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=132.734) [the project ID as well. Let's go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=135.43828571428574) [configure the permissions so that everyone](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=138.50633333333334) [in the domain can use this chatbot and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=140.15685714285718) [then save this configuration. At this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=143.60866666666666) [point, we might think that we are good to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=146.05666666666664)[go. We might believe that we can go to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=148.36733333333333) [chat.google .com and access our chatbot,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=150.503) [so let's just go ahead and see what](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=153.56550000000004) [happens. We click through some of these](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=156.66419999999997) [perfunctory dialogs, and the next thing we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=158.62028571428579) [know, we are presented with our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=160.53799999999998) [Spikey\_Chatbot. So far, so good. Let's try](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=163.06875) [and interact with this chatbot and see](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=165.35999999999996) [what happens by typing into the text](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=167.25187499999998) [window in the bottom right. So we type the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=169.64911111111107) [message, "Hey there, I didn't receive my](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=172.54600000000002) [order! " But now, unfortunately, things](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=174.54666666666662) [don't work. And the reason for that is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=177.28733333333338) [because we haven't set up the permissions](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=179.72050000000007) [for the chatbot service account correctly.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=181.4352857142857) [Notice, however, that there is no](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=184.779) [indication that this is the cause of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=186.326) [problem. All that we can see is that our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=188.41844444444448) [Spikey\_Chatbot is not responding. Not very](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=190.174) [helpful, but we can fix this easily](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=193.75275000000002) [enough. We navigate into the Identity and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=195.77633333333333) [Access Management console, and there we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=199.3042)[click on the Add button, which is a way](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=202.05999999999997) [for adding new roles. The service account](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=204.965) [that's being used by our chatbot is easy](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=207.08171428571427) [enough to identify from the name, it's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=209.56149999999997) [chat-api-push. Let's go ahead and map this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=213.49899999999997) [to some curated roles in Pub/Sub. The](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=215.99299999999997) [Pub/Sub curated roles available are](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=218.6533333333333) [Pub/Sub Admin, Editor, Publisher,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=221.11450000000002) [Subscriber, and Viewer. Of these, Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=223.36575) [Publisher is the most relevant because our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=226.3615714285714) [chatbot is going to need to publish](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=228.53471428571427)[messages on this topic. We are separately](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=231.40471428571425) [going to have a bot.py file, which is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=234.352375) [going to run using the project owner](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=236.50775) [service account we've already created to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=238.28666666666666) [reply. So here all that we need is the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=240.26577777777777) [Pub/Sub Publisher role. Let's confirm that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=244.0856) [this is fine. And, yes, indeed, our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=246.85349999999997) [service account does show up as Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=249.00157142857148) [Publisher. Let's now activate Cloud Shell.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=251.57240000000004) [And within Cloud Shell, let's go ahead and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=254.456) [make sure that we are referencing the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=256.098)[service account which we created earlier](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=258.416) [on in this course. That is a different](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=260.32228571428556) [service account which had project owner](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=262.556) [privileges. All commands that we run from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=266.1457142857144) [this Cloud Shell are going to be executed](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=267.90049999999997) [using this project owner service account.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=270.1175) [Let's give our chatbot another spin. So we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=272.844)[switch back to the chatbot window and type](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=274.93500000000006) [out the same message, "Hey there, I didn't](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=277.3588571428572) [receive my order! " And now let's switch](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=280.3657777777779) [back to Cloud Shell and pull from this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=282.9465000000001) [topic. This is the topic which our chatbot](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=285.32525) [was supposed to be writing to. We already](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=287.70624999999995) [had a subscription on that topic. Remember](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=290.32875) [that we created it first thing in this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=292.582) [demo, and it was called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=294.6646666666667) [spikey\_chatbot\_sub. So we run a pull, and,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=296.118) [indeed, we do find that our chatbot](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=300.444625) [message does appear. We can confirm that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=302.108) [it's exactly what was typed out because](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=304.949) [the email from where it originated was](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=306.7873750000001)[spikey.engineer, and the text of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=309.234) [message was, indeed, "Hey there, I didn't](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=311.676) [receive my order! " In addition, the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=314.71) [message type also shows up as direct](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=317.802) [message. We've successfully configured our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=321.169) [chatbot to write onto our topic. Let's now create a bot.py which is going to reply.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=7&mode=live&start=323.07000000000005)

[Using a Simple Python App to Respond to Chat Messages](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live)

[Let's start coding up our chatbot back](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=2.017) [end. We are in the code editor where we go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=4.859) [ahead and create a new directory called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=6.8976) [pubsub\_chatbot. Inside this, let's create](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=10.170714285714283) [a file called bot.py. The contents of this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=12.517499999999998) [file are based off of a GitHub link, which](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=15.330333333333332) [in turn is available at developers.google](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=18.049000000000003)[.com. Let's get started coding up our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=21.567666666666664) [bot.py. We start off with a bunch of](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=25.262999999999995) [import statements, notably the Google](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=27.193124999999995) [Cloud Pub/Sub client library. Next, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=29.243399999999994) [import TextBlob. This is a standard](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=33.5065) [library available in both Python 2 and 3](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=35.992428571428576) [for processing text data. It has simple](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=39.28022222222223) [NLP algorithms such as parts of speech](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=42.11000000000001) [tagging, sentiment analysis, and so on. We](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=44.628) [want to use TextBlob in order to respond](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=47.13655555555557) [to our user based on the tone or the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=49.72433333333333) [polarity of the user's input. Next, we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=53.27100000000001) [define a bunch of variables for the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=56.1485) [PROJECT\_ID, SUBSCRIPTION\_NAME, and the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=58.83566666666667) [CREDENTIALS. Note that this subscription](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=62.054333333333346) [is the spikey\_chatbot\_sub, which we had](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=63.92966666666668) [created earlier on in this demo, and the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=66.21380000000002) [credentials point to our service account](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=68.403) [credentials, that is, the project owner](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=70.7) [service account that we had defined the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=73.54) [first thing in this course. Next, we move](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=75.315) [on and define a method called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=78.75766666666668)[receive\_messages. Here we instantiate the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=80.219) [Pub/Sub SubscriberClient and get a handle](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=82.867) [to our subscription. As usual, we need to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=85.682) [fully qualify this with both the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=88.307) [PROJECT\_ID and the SUBSCRIPTION\_NAME. The](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=90.70700000000004) [next bit of code should also seem](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=93.58633333333334) [familiar. This is a callback function,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=95.37366666666672) [which we want invoked each time a message](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=96.93149999999997) [is received on our subscription. Within](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=99.233) [this callback function, we print out our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=101.89759999999998) [message to screen. We get the event\_data](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=105.52787499999998) [in the form of JSON. And then we make a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=108.49477777777776) [call to another function called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=111.59700000000002) [send\_response. That send\_response function](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=113.413) [is basically going to determine the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=115.74299999999998) [polarity of what the user sent us, and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=117.74799999999998) [then based on that, construct a response,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=120.1525) [and then send it to the chatbot. More on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=122.477375)[that in a moment. First, let's just wire](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=125.27799999999999) [up our callback with the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=127.863) [subscriber.subscribe call. Remember that](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=130.34766666666667) [we've got to do this because pull](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=133.12199999999999)[subscriptions are asynchronous. We never](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=134.9825) [know when a message is going to arrive on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=136.97299999999998) [our subscription, and so we've got to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=138.99714285714285) [specify the callback function that's going](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=141.06528571428572) [to be invoked each time a message does](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=142.93975) [arrive. And because this is asynchronous,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=145.489) [we need an infinite loop down below. Now](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=148.25625)[let's turn our attention to the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=151.86214285714286) [send\_response call, which we invoked from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=153.453) [within our callback. This is really the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=156.079) [heart of the bot.py. This function is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=159.59699999999998)[easiest to understand if we do so from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=162.07985714285712) [bottom to top. The second part of this](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=164.829) [function actually goes ahead and builds a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=167.30471428571423) [service endpoint and calls the chatbot](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=169.90685714285715) [API. That part is fairly simple. This](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=172.934) [involves getting a handle to the chatbot](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=175.602) [API and storing it in a variable called](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=178.581625) [chat, and then going ahead and invoking](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=181.51271428571428) [the .spaces .messages .create method on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=184.26716666666667) [it. The portion above that is a little](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=188.095) [more complex. In order to actually make a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=191.031) [request to our chatbot, we need to apply](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=194.239) [certain credentials to our HTTP request](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=197.028) [headers. Now we're going to authenticate](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=200.2414285714285) [our service using the service account.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=202.01985714285718) [This is the project owner service account](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=204.152) [that we had created early on. And that in](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=206.379) [turn requires us to work with scopes.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=209.5582) [There is only one scope available for each](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=211.955) [chatbot in the Hangouts world. We need to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=214.142) [find that scope and then go ahead and pass](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=217.46266666666662) [it in. There's one method left for us to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=220.041375) [discuss, that's the format\_response](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=223.1758571428571) [method. This is not all that important. It](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=224.91649999999998) [just deals with the various different](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=227.69714285714286) [kinds of income events, which could be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=229.492) [direct message events or chat room events.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=231.878) [The one bit of code that we have added](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=235.706) [here and which is important has to do with](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=238.01990000000006)[calculating the polarity of our message.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=240.349) [So we get hold of the message text, then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=244.024) [we go ahead and initialize a TextBlob](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=245.90769999999986) [object with that text, and then based on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=248.82214285714278) [the sentiment.polarity, we respond with](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=251.14725000000004) [either a positive or a negative or a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=253.72780000000003) [neutral greeting. So if the polarity is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=258.1342222222222) [greater than 0, our response starts with](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=260.6086249999999) [the words, "Hi, I'm glad you're having a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=262.82566666666673) [good day. " Notice how we are careful to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=265.9480000000001) [address our recipient by name. We do so](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=268.70699999999994)[using the senderName, which we have](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=271.8132499999999) [extracted from the message. And once we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=273.8423333333334) [have constructed this response, we go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=276.47642857142847) [ahead and send it back out. That gets us](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=278.9842000000001) [to the end of our bot.py. Let's switch out](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=282.59166666666664) [of the code editor and into Cloud Shell.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=285.546) [We are going to go ahead and run our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=287.80366666666663) [bot.py. So let's take the usual](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=291.21275) [precautions. Let's specify the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=293.4181666666667) [GOOGLE\_APPLICATION\_CREDENTIALS to point to](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=294.453) [our service account JSON file. And then](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=296.946)[let's use pip install to ensure that we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=300.38124999999997) [have the latest version of the Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=302.158) [client library. Let's do the same for the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=304.343) [oauth2client. We want to make sure that we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=308.8741428571428) [have version 3.0 .0. This is going to be](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=311.4088181818183) [required for the application of our](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=313.68825000000004) [credentials to the HTTP request header.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=315.4478571428572) [And while we're at it, let's also go ahead](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=317.61699999999996) [and make sure that the TextBlob library is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=320.2205555555556) [installed and available. Once that's done,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=323.488) [we are ready to cd into our code directory](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=326.32466666666676) [and actually invoke our chatbot code. So](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=329.2165714285714) [we run python bot.py, and our bot waits](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=333.34128571428573) [patiently listening for messages on the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=337.4670000000001)[spikey\_chatbot\_sub subscription. Let's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=341.1216) [switch back to our chatbot window and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=343.159375) [publish some messages on that topic. So we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=345.171) [are now signed in as Spikey Engineer, and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=348.53211111111113) [let's type out the message, "I did not get](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=350.579) [the package that I had ordered. " This is](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=353.25649999999996) [a pretty neutral message, and so our bot's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=355.81425)[response is neutral as well. It simply](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=358.45342857142856) [asks how it can help. Note, too, that it's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=361.35814285714287) [careful to address us by name. Let's now](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=364.689) [write in a positive message, "I had a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=367.438) [great experience with my phone but I need](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=370.5375) [help. " And the response this time is a](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=373.28866666666664) [little more effusive. The bot responds](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=376.35779999999994) [saying, "Hi Spikey Engineer, I'm glad](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=378.2030000000001) [you're having a good day, how can I help?](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=379.9638571428572) [" Let's try a negative message this time.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=383.4038333333334) [We say, "My product was terrible, I need](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=386.071) [an exchange. " And our bot is apologetic.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=388.285) [It says, "Oh I'm sorry to hear that Spikey](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=391.137) [Engineer, how can I help? " Now we could,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=393.129) [of course, make the back end as complex as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=395.39966666666663) [we want, but this serves the purpose. We](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=397.5223) [have demonstrated the use of Pub/Sub along](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=400.1125714285714) [with Google Hangouts chatbot. So let's switch back and kill our bot process.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=8&mode=live&start=402.7914)

[Summary](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live)

[We've now come to the end of this module](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=2.434) [and the end of this course. This module](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=4.094) [was all about working with the Pub/Sub](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=6.032000000000001) [client library from Python. Given a topic](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=8.2094) [and a subscription, we coded up various](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=11.257624999999999) [variants of publishers and subscribers. We](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=13.85257142857143) [explored topics such as asynchronous, as](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=16.9575) [well as synchronous publishing, and](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=19.2192) [sending out messages in batches based on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=21.00457142857143) [latency, as well as on the size of the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=23.176727272727273) [messages. We learned how flow control can](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=26.063272727272718) [be used to prevent a fast publisher from](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=27.690666666666658) [overwhelming a slow subscriber. And we](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=30.71733333333334) [then moved on to a pretty substantial use](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=32.78311111111112) [case. We built a Google Hangouts chatbot](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=35.8608) [using Pub/Sub. Before we call a wrap on](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=39.14474999999999) [the course, here's a call to action.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=41.31975000000001) [Please be sure to delete any resources you](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=43.296) [used during this course. That includes](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=45.38) [Pub/Sub topics and subscriptions. It's](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=48.18366666666667) [probably also a good idea to just go](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=50.93033333333333) [through all of the different resource](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=53.069) [sections and make sure you haven't left](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=54.707) [any VM instances or Cloud Functions or](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=56.527875000000016) [anything else lying about. And, finally,](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=59.194857142857146) [here are some additional courses for](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=61.62814285714285) [further study. The first one I'd recommend](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=64.62833333333333) [is Developing Stream Processing](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=67.14628571428574) [Applications with AWS Kinesis. And the](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=68.82000000000001)[second one has to do with Structured](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=71.3965) [Streaming in Apache Spark 2. Both of these](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=73.01666666666667) [are a part of Pluralsight's awesome](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=76.358375) [catalog. I hope you enjoyed this course. Thank you for your time.](https://app.pluralsight.com/player?course=google-cloud-platform-pubsub-architecting-stream-processing-solutions&author=vitthal-srinivasan&name=db95305b-447a-4653-8f46-efc043ce5350&clip=9&mode=live&start=77.955625)