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We'll see how best](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=42.138) [to design our schema to enable fast reads](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=44.66644444444445) [and writes, and we'll study how data in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=47.17620000000001)[Bigtable can be accessed using the command](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=49.46033333333335) [line, as well as client libraries. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=51.8422) [start off by studying the internal](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=54.51171428571429) [architecture of Bigtable and how data is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=55.98) [stored within it using the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=58.615) [four-dimensional data model. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=60.083) [understand how Bigtable clusters, nodes,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=62.864200000000004) [and instances work, and how Bigtable works](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=65.046) [with Colossus, Google's proprietary](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=67.94166666666666) [storage system behind the scenes. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=70.232) [then access Bigtable using both the Hbase](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=73.15700000000001) [Shell, as well as cbt, Google's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=75.77000000000001) [command-line utility specially built to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=78.35149999999999) [work with Bigtable. We'll create and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=80.84449999999998) [manage tables and see how we can export](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=82.82687499999999) [and import data using sequence files.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=85.12349999999999) [We'll also see how we can use client](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=87.923) [libraries in Python, planning on cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=90.04) [data lab to work with our data. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=92.45885714285713)[study how manual failovers can be handled](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=95.26614285714287) [when we have single cluster routing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=97.09987500000001) [enabled. We'll then move on to how](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=99.63712500000004) [application profiles can be used to enable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=101.54971428571429) [multi-cluster routing on Bigtable. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=103.659) [monitor our instance using Stackdriver and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=106.4336) [see how we can programmatically scale our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8ccea90a-1633-40e5-804a-1fc23ef44313&clip=0&mode=live&start=108.26166666666666)[Bigtable cluster. 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It has this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=67.595875) [interesting architectural setup of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=70.26350000000001) [clusters and data storage behind these](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=71.837375) [clusters. Bigtable is Google's proprietary](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=74.68362499999996) [technology, and with similar to HBase,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=76.841) [there is no exact equivalent which offers](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=78.909) [all of Bigtable's features in the open](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=81.956) [source world. You have to be careful when](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=84.061125) [you're storing data in Bigtable though.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=86.86814285714286) [You need to design your schema, especially](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=88.627) [your row keys such that you get the best possible performance.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=0&mode=live&start=90.785375)

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If you're familiar with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=14.333333333333337) [other cloud platforms such as AWS or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=16.09266666666667) [Azure, that's good too. We'll access](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=18.89722222222222) [Bigtable programmatically using Python in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=21.567999999999998) [this course so basic Python programming](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=23.416874999999997) [would be useful. Experience with HBase is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=25.56125) [not required. We'll start from scratch and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=29.069666666666663) [understand Bigtable's schema and data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=31.480333333333327) [model. If you have experience with HBase,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=33.7034) [that will be helpful, but it's not needed.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=35.731) [If you feel that you're not really](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=37.956) [familiar with cloud computing, here are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=39.41637499999999)[some other courses on the GCP that you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=41.06571428571429) [watch before this one. Choosing and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=43.192499999999995) [implementing Google Cloud Compute Engine](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=45.68483333333333) [Solutions will introduce you to virtual](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=47.79633333333333) [machines on the GCP. Architecting Google](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=50.05099999999999) [Cloud Storage Configurations will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=52.5575) [introduce you to the basics of elastic](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=54.300000000000004) [storage on the Google Cloud. We'll start](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=57.142) [off with a basic introduction to Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=60.196) [for data storage. We'll discuss when and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=62.258399999999995) [why you would choose to use Bigtable for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=64.653) [your data. We'll discuss instances,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=67.27833333333332) [clusters, and nodes. We'll discuss basic](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=69.035) [Bigtable architecture where the lookup of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=71.994) [your data is separated from data storage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=74.21450000000002) [itself. We'll also talk about how you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=76.78050000000002) [best design your schema for optimized](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=78.86649999999997) [performance. We'll then see the various](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=81.93600000000004) [tools that you can use to interact with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=83.47174999999997) [Bigtable to set up your tables, add](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=85.70577777777781) [columns and data to these tables. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=88.45933333333335) [work with the HBase Shell, as well as the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=91.604) [cbt, the Cloud Bigtable command-line tool.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=94.47571428571429) [We'll also see how we can access Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=98.17) [programmatically using Python client](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=100.237)[libraries. And in the module after that,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=102.80420000000001) [we'll work with instances, clusters, and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=105.016) [nodes. We'll configure application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=107.70142857142854) [profiles which allow us to specify](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=109.47860000000001)[multi-cluster routing. We'll see how we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=112.41833333333334) [can monitor our Bigtable instance using](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=114.37900000000002) [Stackdriver, and we'll see how we can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=116.13600000000001) [scale our clusters programmatically.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=119.34371428571428) [Through all of our demos, we'll assume](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=121.426) [that we are engineers working at this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=122.97474999999999) [organization called SpikeySales. com, this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=124.81) [is a hypothetical online retailer and they](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=128.46314285714286) [specialize in flash sales of trending](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=131.05542857142856) [products, which means there's a huge](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=133.428) [variation in user traffic, very high](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=135.468)[traffic during sale days, no traffic](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=138.18400000000003) [otherwise. Engineers at SpikeySales are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=140.51600000000002) [contemplating a move from an on-premise](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=142.81679999999994) [data center to the cloud and they are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=144.646875) [specifically looking into the GCP. Cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=147.18457142857145) [Computing fits their needs perfectly. They](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=149.70533333333339) [don't want to hold around idle capacity](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=152.54085714285713) [during off-sale periods and they want](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=154.37366666666665) [elastic global access to their data.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=156.79142857142858) [Engineers at SpikeySales are especially](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=159.848) [excited about Bigtable. Because of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=162.327) [nature of their flash sales, low-latency](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=165.210375) [considerations are very, very important.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=167.6035) [When they're writing offer-related and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=170.641) [order-related information during their](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=172.418)[sale days, their interested in low latency](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=174.5036) [and high throughput for their read](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=176.8387142857143) [operations. They're also interested in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=179.46516666666665) [fact that Bigtable is fully managed and massively scalable.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=1&mode=live&start=181.1421428571429)

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Now there](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=12.90925) [is a lot to parse here, in fact, every](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=15.101799999999999) [word here is important. Let's parse](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=17.407600000000002) [exactly what Bigtable is all about. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=19.9615) [first thing that ought to jump out at you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=22.384666666666668) [is the fact that Google Cloud Bigtable is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=24.061750000000004) [a NoSQL database, which means Bigtable is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=26.84857142857143)[different from other storage services](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=30.223499999999998) [offered by Google, such as BigQuery, Cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=32.321) [SQL, Cloud Spanner. All of these are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=34.9585) [structured databases that work with SQL.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=38.026) [There is just one other NoSQL offering on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=40.37012500000001) [the GCP and that is Cloud Datastore. Cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=43.34280000000001) [Datastore is typically used to store](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=46.161) [entities which can then be indexed for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=48.009) [very fast lookup. You'll choose to work](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=50.587) [with Bigtable when you want very low](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=53.63) [latencies for your read and write](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=55.531)[operations and you're performing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=57.406) [analytical processing on your data.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=59.50839999999999) [Bigtable is typically used for OLAP](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=61.771) [applications just like the BigQuery data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=64.219)[warehouse, rather than for transaction](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=66.88) [processing. If you want to do OLTP, or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=70.08999999999997) [online transaction processing, you'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=72.9575) [prefer to use Cloud SQL or Cloud Spanner.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=74.79988888888889) [When you store records in Bigtable, it](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=78.415) [indexes all of the records based on just](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=80.32511111111111) [one key, this is called the Row Key. This](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=82.886) [is exactly like in HBase. Bigtable sorts](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=85.55799999999999) [all of the rows based on this one column,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=87.81475) [this column is called the Row Key. Because](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=90.59242857142856) [Bigtable has just the one index on the row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=93.57250000000002) [key, the design and choice of your row key](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=96.8843333333333) [is critically important to how well your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=99.9027142857143) [application performs. If you design your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=102.59985714285718) [row key so that all of your reads and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=104.1414) [writes are very close to one another on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=106.312) [sequential row keys, you'll find that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=109.34680000000002) [performance degrades terribly. Whenever](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=112.27450000000002) [you design your tables and the schema for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=114.242) [your data on Bigtable, remember that the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=117.039) [row key is the only index that you have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=119.49500000000002) [available. The design of your row key is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=122.80775) [very, very important. What is really](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=126.00069999999997) [amazing about Bigtable is the scale at](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=128.22785714285715) [which it operates. It supports the largest](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=130.57100000000003) [data sizes of any GCP structured storage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=133.19700000000006) [service, it scales to Petabytes and the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=136.28000000000003) [lookup time to retrieve information from](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=138.91524999999993) [Bigtable across petabytes of data is in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=141.1504) [the order of milliseconds. In fact,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=143.88240000000005) [Bigtable is so geared for large datasets](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=145.98250000000002) [that if you have datasets that are too](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=147.8685) [small, under 1 TB, you'll find that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=150.2465) [Bigtable performs pretty poorly. You'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=152.462) [choose to use Cloud Bigtable if the kind](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=155.934125) [of data that you want to store there is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=158.296) [sparse in nature. Let's say you have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=160.514)[records with many attributes, but not all](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=162.5988571428571) [attributes are available for every record.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=164.83133333333333) [That's when you'd use Bigtable. Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=167.434) [is similar to HBase based on the fact that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=169.635625) [it relies on a columnar representation of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=172.40328571428572) [data. Another thing that sets Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=175.439) [apart from other GCP services is how fast](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=177.58828571428572) [it is. It provides very fast writes, as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=181.04124999999996) [well as reads. Writes, in fact, are orders](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=184.49233333333328) [of magnitude faster than with BigQuery or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=187.5301428571428) [Cloud SQL. Bigtable tends to work well](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=190.6555714285714) [with certain kinds of data. You would](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=193.21422222222228) [choose Bigtable if you have time series](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=195.18625) [data that you need to write out to some](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=197.11222222222221) [kind of storage. Time series data tends to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=199.19150000000002) [be naturally ordered and you'll lookups on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=201.91914285714293) [this kind of data will also tend to be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=204.09312500000004) [sequential in nature. Bigtable also works](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=207.1643333333334)[very well when you want to store Internet](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=209.081125) [of Things related data. Usually, this will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=211.72142857142856) [be data that is collected by different](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=214.37757142857146) [sensors placed on different devices and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=216.79100000000003) [this will then be written out to Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=218.9007142857143) [as a stream of writes. Bigtable also works](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=221.8776666666667) [very well when you want to store financial](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=224.77437500000002) [data. Financial data is typically in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=227.41275000000002) [form of time series, which means it's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=229.22850000000005) [naturally ordered. An important](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=232.60114285714286) [consideration for when you choose to store](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=234.57)[data in Bigtable is that your dataset](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=237.202) [should be huge, greater than 1 TB where](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=239.7312) [every record is less than 100 MB and each](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=243.22625000000005) [cell contains less than 10 MB of data.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=246.863) [There are, of course, cases where Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=250.338) [is just not suitable for your data. If you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=252.19962499999997) [require a SQL interface that you'll use to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=255.74525000000003) [query your data, Bigtable doesn't have it.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=258.1876) [In such situations, you'd go with Cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=260.445) [SQL or Cloud Spanner where you can store](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=263.33337499999993) [SQL data at scale. If you want a data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=266.0209999999999) [warehouse, you choose BigQuery. All of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=268.53) [these have SQL interfaces. If you're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=271.4196666666666) [running transaction processing or OLTP](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=274.15540000000004) [applications, Bigtable does not offer](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=276.42533333333336) [asset properties or transaction support.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=278.93416666666667) [Here, Cloud SQL or Cloud Spanner is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=281.595) [storage service that you choose. Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=284.311) [requires that your data be structured in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=286.97183333333334) [the form of key value pairs. If you want](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=289.24075000000005) [to store blobs such as image files or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=291.5706666666666) [video files, Bigtable is not suitable. For](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=293.88225)[blob data, you just go with Cloud storage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=296.7214285714286) [buckets. Or if you're looking to store](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=299.5973333333333) [hierarchical data in the form of XML](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=301.9897142857144) [documency, Bigtable is not the storage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=304.6865714285716) [mechanism that you'd use. Cloud datastore](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=307.1013333333334) [is probably better suited. If you're going](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=309.6031666666666) [to go with Bigtable, there are some](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=312.7202857142857) [choices you have to make about how you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=314.33250000000004) [want to interact with it. You can connect](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=316.4705) [to Bigtable using cbt. This is the native](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=319.04485714285715) [GCP command-line tool, it stands for Cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=322.0442857142857) [Bigtable. Or if you already worked with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=325.33899999999994) [HBase earlier and are familiar with its](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=327.72525) [command line, you can choose to use the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=329.6129999999999) [Apache HBase command-line shell. Or if](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=332.29399999999987) [you're connecting to Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=334.8970000000001) [programmatically, programmatic client](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=336.85800000000006) [libraries are available. Multiple](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=338.6086) [high-level programming languages are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=341.03066666666666) [supported. Java and Python are the most](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=343.344) [popular. A common question that developers](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=346.2775714285713) [have when they're introduced to Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=348.1474999999999) [is how is Bigtable different from HBase](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=350.0265714285714) [and why is it better. The first thing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=352.417125) [relates to scale. Bigtable is massively](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=355.45599999999996) [scalable. You can increase your cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=358.23274999999995) [size to handle any size of data, and since](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=360.42099999999994) [it's fully managed, adding additional](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=363.923) [nodes to your cluster is very](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=366.04166666666674) [straightforward. You can resize your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=369.1734) [Bigtable instance without any downtime. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=370.9106666666667) [your Bigtable is serving production](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=373.46733333333333) [traffic, you don't need to stop traffic](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=375.249) [before you perform administrative tasks,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=377.446) [which makes administration very, very](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=379.868) [simple on Bigtable. A really cool feature](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=382.04650000000004) [that Bigtable has to offer is something](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=384.62850000000003) [that happens behind the scenes, it's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=386.606) [completely hidden from you. Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=388.90133333333335) [observes the usage patterns of your data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=390.98733333333337) [and it then automatically redistributes](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=393.8633333333333) [the data to split the load across cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=396.00714285714287) [nodes, which means Bigtable can try and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=399.28133333333335) [eliminate a lot of the hotspotting issues](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=402.048375) [that you might face. Hotspotting occurs](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=404.277) [when a lot of your traffic is directed to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=406.51214285714286) [the same cluster node, which then gets](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=409.1142857142858) [overloaded. All you have to do when you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=412.41679999999997) [work with Bigtable is to focus on schema](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=413.9531111111111) [design. Bigtable takes care of everything else.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=2&mode=live&start=416.8339999999999)

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There are two broad categories](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=11.421) [into which data can be divided. You might](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=14.281) [want to store unstructured data in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=16.81885714285714) [form of blobs or your data might be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=18.9922) [structured in the form of rows and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=21.237) [columns, key value pairs, attribute value](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=23.225874999999995) [pairs, etc. If you want blob storage on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=26.105714285714285)[the GCP, you'll choose to go with cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=29.138249999999992) [storage buckets or store data on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=31.299571428571422) [persistent disks attached to your VMs. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=33.943000000000005) [your data is structured, then you have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=37.040800000000004) [more choices. You might want a SQL](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=39.07739999999999) [interface to your data or you might want a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=41.177777777777784) [NoSQL database. If you're looking at NoSQL](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=44.50300000000001) [storage, the GCP has two options, Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=46.967333333333336) [and Datastore. If you're looking for a SQL](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=50.609750000000005) [interface, then you have to consider](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=53.84599999999998) [whether you want to perform transaction](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=55.30225) [processing or analytical processing with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=57.3622) [your data. 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If you're looking](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=82.977) [for NoSQL technology, Bigtable will be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=86.40800000000002) [your choice. Both BigQuery and Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=88.72619999999998) [are massively scalable. They can store and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=91.6007142857143) [retrieve petabytes of data very easily.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=94.49285714285716) [BigQuery is entirely serverless and scales](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=97.19999999999999) [automatically. You don't have to provision](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=100.79899999999999) [and nodes or clusters to use BigQuery.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=102.54799999999997) [Bigtable, on the other hand, requires](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=104.954) [cluster provisioning. The serverless](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=107.32833333333333) [nature of BigQuery ensures that it](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=109.80833333333334) [supports autoscaling. You don't have to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=112.7535) [design your cluster. Additional nodes will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=114.76971428571427) [be added to support more data and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=116.55942857142857) [additional queries. In the case of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=119.1438)[Bigtable, you need to design your cluster.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=120.90988888888887) [Specify this type is for your machines and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=122.5912857142857) [do whatever else is involved in cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=124.93214285714285) [provisioning. Big query supports data that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=127.75225) [is in a tabular format in the form of rows](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=129.75375000000005) [and columns. The data is two-dimensional](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=133.57999999999998) [in nature. Bigtable, on the other hand,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=135.7633333333333)[follows the four-dimensional columnar data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=138.036) [model. We'll see the details of this in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=141.00850000000005) [just a bit. Data retrieval using BigQuery](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=143.44609999999992) [is fast, but it's not as fast as Bigtable.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=146.22933333333333) [Latency order of seconds in the case of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=149.5) [BigQuery. In the case of Bigtable is of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=152.2262222222223) [the order of milliseconds. In the case of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=155.00809090909092) [BigQuery, reads are fast, but writes are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=157.63449999999997) [much slower. In the case of Bigtable,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=160.15540000000001) [reads, as well as writes are very, very](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=162.3) [fast. If you're using BigQuery, you'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=165.53279999999998) [find that storage is cheap and you only](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=167.539) [pay for processing your data, that's also](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=170.00050000000007) [relatively cheap. Bigtable, on the other](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=172.822) [hand, is up at all times, even when you're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=174.81644444444447) [not using it and it's fairly expensive.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=177.18599999999998) [It's also useful to understand the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=180.301) [differences between Cloud Spanner and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=181.67) [Bigtable. Both of these are Google](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=183.95000000000005) [proprietary technology and specially](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=186.19266666666672) [designed to work at scale. Cloud Spanner](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=187.834) [is a globally distributed massively](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=191.858) [scalable relational database management](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=194.854) [system, which means it offers SQL access](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=196.883) [to your data. Bigtable, as you already](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=199.3) [know, is a NoSQL database. Cloud Spanner](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=201.045)[is what you'd use for transaction](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=204.6667142857143) [processing across a geographically](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=206.69525) [distributed region. It supports online](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=208.81799999999998) [transaction processing, or OLTP. Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=211.67825) [is what you'd use for OLAP, or online](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=214.56657142857145) [analytical processing. Cloud Spanner has](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=217.762) [nodes distributed across multiple](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=220.10799999999998) [geographic regions and it yet offers very](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=221.68183333333332) [strong support for ACID properties and for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=224.75366666666667) [transactions. Bigtable offers atomicity](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=228.2735) [only at the row level and no support for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=229.93528571428575)[transactions. You'll find that Spanner and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=234.40899999999993) [Bigtable are similar in many ways. They're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=236.59657142857142) [both massively scalable and can work with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=238.82416666666666) [petabytes of data. Both of them require](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=241.1932) [cluster provisioning. You set up a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=243.95033333333333) [Bigtable instance, you set up a Spanner](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=245.6327777777778) [instance, both are sensitive to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=247.76200000000003) [hotspotting. This tends to occur when most](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=250.2295000000001) [of the read and write operations to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=252.0136666666666) [database are close together and hit the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=254.87542857142853) [same cluster node. That node then tends to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=257.7857499999999) [get heavily loaded and slows down](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=260.52500000000003) [operations. In order to extract the best](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=263.27299999999997) [performance from both of these databases](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=265.5322857142859) [and to prevent hotspotting, key design and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=267.2963749999999) [schema design for your records requires](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=270.24999999999994) [very careful consideration. Spanner](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=273.36685714285704) [supports the relational data model, which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=275.27066666666667)[means data can be accessed using two](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=277.38544444444443) [dimensions. Bigtable, on the other hand,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=280.33555555555546) [follows the columnar data model which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=282.118) [requires four dimensions to look up data.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=284.172) [Data updates and retrieval in Spanner is a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=287.833) [little slower as compared with Bigtable.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=290.264) [In the case of Spanner, writes are much](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=292.744) [slower than reads. In the case of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=294.867) [Bigtable, write and reads are both very](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=296.718) [fast. Both Spanner and Bigtable because](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=299.67024999999984) [they run on Google proprietary technology](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=301.5484285714286) [and offer such strict SLAs are very](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=303.98833333333334) [expensive. In order to round out our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=308.09283333333343) [understanding of when and how to use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=310.40349999999995) [Bigtable, let's quickly compare and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=312.53533333333326) [contrast Bigtable with Datastore, the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=314.82866666666666) [other NoSQL database available on the GCP.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=317.5419999999999) [Datastore doesn't work well with very](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=321.61) [large datasets. Datastore is best at](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=324.11874999999986) [terabyte scale. In the case of Bigtable,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=326.6050000000001) [you know it scales to petabytes. Datastore](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=328.54999999999995) [is serverless in nature. There is no](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=330.9224)[cluster provisioning required to get up](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=333.67300000000006) [and running. Bigtable requires cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=335.34279999999995) [provisioning. Datastore is best optimized](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=337.83699999999993) [for hierarchical data, data stored in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=339.89400000000006) [form of objects which are made up of key](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=342.05171428571435) [value pairs and have hierarchical](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=344.47855555555543) [relationships between them. Bigtable is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=346.612) [optimized for sequential data where every](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=348.9046666666667) [record has attributes in the form of key](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=351.44971428571426) [value pairs. Datastore is optimized for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=354.10760000000005) [fast random lookup on any entity](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=356.586)[attribute. Bigtable is optimized for fast](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=359.5922) [sequential read and write. GCP offers a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=361.95633333333325) [free tier for Datastore. If you don't use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=364.80620000000005) [your database, no charges are incurred. In](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=367.3803333333333) [the case of Bigtable, you have to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=370.08) [provision clusters which stay up even when](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=371.578) [you don't use your database, which means](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=373.833) [you will incur charges. Once you're using](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=376.25700000000006) [them at full scale, both Cloud Datastore and Bigtable are relatively expensive.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=3&mode=live&start=378.93928571428575)

[Storage Model](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live)

[At this point, we've understood the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=2.35) [characteristics of Bigtable and when we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=3.742) [would choose to store our data here, but](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=6.225) [how does Bigtable allow fast sequential](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=8.922142857142857) [reads and writes. For this, we need to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=11.665) [look into Bigtable's storage model. Let's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=13.64) [step back a little bit and understand how](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=16.669500000000003) [data is stored in a traditional relational](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=18.481714285714286) [database in the tabular format. We want to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=20.762166666666666) [store notification data in a traditional](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=24.22075) [database, this follows a two-dimensional](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=25.8768)[data model. If you wanted to access data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=28.331666666666667) [in a particular cell, you need to specify](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=31.415000000000006) [the unique ID for that record and the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=34.407) [column name for that cell. You're required](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=37.25487499999999) [2D indexing to access a particular value.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=40.61314285714284) [Just like HBase, Bigtable has a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=43.798) [four-dimensional data model. You need to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=46.8056) [specify four bits of data in order to look](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=49.40599999999999) [up a particular value. The four indexes](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=51.77257142857143) [that you need to specify are the row key,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=53.650125) [the column family, the column name, and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=56.80014285714285)[finally, the timestamp. When we actually](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=60.02000000000001) [work with Bigtable, we don't usually](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=62.157) [specify the timestamp. In that case, the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=63.961499999999994) [latest version of the data and the latest](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=66.15449999999998) [timestamp is retrieved. The row key is a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=69.01585714285713) [unique identifier for every record that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=71.73525) [you store in Bigtable. This is the only](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=73.635) [value on which Bigtable data is indexed.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=76.48899999999998) [The values in every record are grouped by](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=79.09385714285715) [column family. A column family is a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=82.28100000000002) [logical grouping of values and values](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=84.67875)[which are generally retrieved together](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=86.61700000000002) [should belong to the same column family.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=88.21933333333334) [Every column family contains one or more](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=90.80599999999998) [columns. They're often referred to as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=93.8444) [column qualifiers or column names. Think](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=95.58750000000002) [of the column name as the key and the data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=98.84309999999999) [that you stored within a column as the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=101.186375)[corresponding value. Every value stored](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=104.03166666666667) [within a column is versioned by timestamp.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=106.32899999999998) [The same column can hold multiple values](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=109.818) [for the same data at different timestamps.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=112.416) [Data stored in Bigtable is typically](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=115.735) [sparse in nature, which means every record](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=117.81014285714285) [need not have values for each of these](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=120.34599999999998)[columns. This entire visual here](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=123.36400000000003) [represents one row or one record in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=125.25233333333335) [Bigtable. To work with an example, let's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=128.40116666666665) [assume that we are storing employee data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=130.82324999999992) [in Bigtable, the employee id could be the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=133.35814285714284) [row key, the column families could be work](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=135.54775) [related information or personal](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=138.09685714285717) [information. Work related information](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=140.29525) [could include the department where the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=141.871) [employee works, the grade of the employee,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=144.07399999999998) [the employee's title. Personal information](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=146.64025) [could include the name of the employee and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=148.27866666666668) [her social security number. If this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=151.28350000000003) [employee has been in the organization for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=153.51242857142856) [a while, her initial title might have been](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=155.4417142857143) [AVP. After some time, she might be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=158.54828571428575) [promoted and a later title would be VP.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=160.621875) [All of these title values are versions at](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=163.23033333333336)[different timestamps. Here is at,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=166.876) [notification data for our ecommerce site.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=170.90757142857143) [This is the notifications regarding offers](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=174.073) [that are sent to our customers. If you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=176.241) [were to store this information in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=178.87825) [Bigtable, this is what a logical structure](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=180.463) [would look like. This is not the actual](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=182.955) [physical layout, this is the logical](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=185.019)[structure of the data. The unique](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=187.213) [identifier representing a particular offer](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=189.6074) [that was sent to a customer would be our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=191.40257142857143) [row key. The row key is what needs careful](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=194.74899999999997) [design to ensure that these records are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=197.6661111111111) [distributed across cluster nodes. When we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=200.68599999999998) [write or read customer notification data,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=204.23214285714283) [we don't want all of our requests hitting](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=206.229) [the same node. The attributes of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=208.772) [notification would be grouped together](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=211.43042857142862) [into a single column family. A column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=213.23185714285714)[family groups together data that logically](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=216.1372857142857) [belonged together. Columns in a column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=218.62033333333332) [family are also laid out especially close](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=221.3325) [to one another so that it efficient to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=223.26587499999997) [retrieve all of the information in a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=225.5338571428571) [column family together. The actual](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=228.01999999999998) [attributes of every notification which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=230.23466666666667) [form the column headers in our tabular](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=232.0437142857143) [structure make up the column names in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=234.16400000000002) [Bigtable. The data stored in our table](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=237.04925) [cells make up the values corresponding to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=240.11033333333333) [each column name and these values are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=243.24242857142855) [versioned by timestamp. You can also](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=245.92979999999997) [configure your table so that these values](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=248.24324999999996) [aren't versioned. Only the latest value is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=250.09400000000002)[important and that's what will be finally](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=252.41314285714282) [stored and retrieved. If you had to store](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=254.81462499999995) [sparse data in a tabular format, storage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=257.02588888888897) [for that data would still be allocated,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=259.0764285714285) [that value would just be missing. In the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=261.43499999999995) [case of Bigtable though, you can store](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=263.802625) [sparse data and no storage will be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=266.38950000000006) [allocated for that data. The missing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=269.1152857142856) [values will simply not be present in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=271.11471428571423) [table. The best way to describe Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=273.78225) [is as a sparse key-value stored that can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=275.7962857142858) [store billions of records in thousands of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=279.1708571428571) [columns. The key here is a combination of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=282.41574999999995) [the row key, column family, and the name](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=284.7026666666665) [of the column, and the value is the value](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=287.028) [that you store here. The part that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=289.8403749999998) [uniquely identifies a record is the row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=292.3784285714287) [key, but the key to look up a particular](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=295.28972727272725) [value is a combination of row key, column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=298.17100000000005) [family, and column value. We've already](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=301.08666666666664) [seen that the row key uniquely identifies](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=303.52571428571423) [a row or a record. You should know that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=305.3124285714286) [Bigtable stores data in the sequentially](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=308.911) [increasing order of row keys and row keys](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=311.2908571428572) [internally are represented as byte](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=314.45266666666663) [strings. When you create a table within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=317.37325)[Bigtable, you'll specify the column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=319.68871428571435) [families that belong to that table. Column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=321.47828571428573) [families are what we'll use to logically](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=323.93557142857145) [group together data. If you have data that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=325.63325) [is retrieved together, they should belong](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=328.45242857142847) [to the same column family because behind](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=330.2212857142857) [the scenes Bigtable stores values that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=332.7686666666667) [belong to the same column family close to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=334.8210000000001) [one another making retrieval efficient.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=337.7234285714287) [The name of the column family is returned](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=340.97) [along with every piece of data, which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=343.391) [means shorter names are better, more](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=345.59375) [efficient. Within the column family, the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=348.46624999999995) [actual field indicating the value is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=350.42633333333333) [column. Columns are units in a column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=353.29825) [family and new columns can be added on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=355.25250000000005) [fly. You don't have to specify up front](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=358.097875) [what columns belong to what column family.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=360.374375) [Once again, make sure that you choose](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=363.179) [short names because the column names are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=365.1687499999999) [included in every data transfer. For](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=367.54100000000005) [example, you might see the column family](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=370.22285714285715) [is work. Once again, make sure that you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=371.985875) [choose short names because the column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=375.06742857142854) [names are included in every data transfer.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=377.182)[Column name is department. It's always](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=380.092) [better to shorten department to say](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=383.0303333333334) [D-E-P-T. You may not always use this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=385.3866) [facility, but Bigtable makes it possible](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=388.30960000000005) [to store several versions of a value based](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=390.12828571428565) [on timestamp. Now any changes that you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=393.68325000000004) [make to a record in Bigtable are mutations](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=396.0676666666667) [to the data and Bigtable immediately](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=398.82949999999994) [doesn't update the table itself. It simply](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=401.5055) [stores around the new value until](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=404.7441428571428) [compaction occurs. The entire process of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=407.81700000000006)[compacting data is abstracted away from](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=410.1497142857142) [you. It happens automatically. This is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=412.25700000000006) [pretty significant. Let's say you delete](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=416.0435) [many records in Bigtable, it doesn't](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=417.87700000000007) [reduce the size of the table immediately.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=419.7459999999999) [In fact, the table size will increase](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=422.837) [because Bigtable will keep the extra data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=424.9) [lying around. Once in a while, when](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=427.29985714285715) [Bigtable thinks it's time, data will be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=429.95759999999996) [compacted and the old data will be removed.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=4&mode=live&start=432.5223749999999)

[Instances, Clusters, Nodes, and Tablets](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live)

[In this clip, we'll get a big picture](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=2.285) [understanding of the various components](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=4.245) [that make up a Bigtable instance. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=6.07) [talk about instances, clusters, and nodes.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=8.49475) [Now this is what a Bigtable instance looks](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=11.375) [like. An external client will talk to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=14.326111111111118) [front-end server pool, the front-end](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=16.866) [server pool will then route requests from](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=19.30433333333333) [this client to nodes which make up the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=21.98885714285715) [Bigtable cluster. These nodes then figure](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=25.022000000000002) [out where exactly the data lives. Know](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=26.949142857142853)[that as a lookup for the underlying data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=29.231444444444442) [which are then stored in tablets within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=31.829428571428576) [the backend storage, which is Colossus.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=34.464) [Colossus is Google's proprietary storage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=37.179) [system. The front-end server pool which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=40.00466666666667) [interacts directly with external clients](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=42.43733333333334) [hitting the table is responsible for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=44.13100000000001) [distributing the request across nodes in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=46.901333333333326) [the Bigtable cluster and it ensures that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=49.42933333333333) [client read and write requests are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=52.01200000000001) [balanced and evenly distributed. Within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=54.82800000000001)[every Bigtable instance is a cluster of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=57.32942857142857) [nodes which are essentially compute engine](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=60.26633333333333) [instances on the GCP. These VM instances](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=62.999) [are arranged to make up a Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=66.672) [cluster. A single Bigtable instance can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=68.90366666666667) [have more than one cluster when](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=71.11157142857142) [replication is enabled and we'll talk](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=73.31928571428571) [about that in just a little bit. Having](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=74.947) [multiple nodes in a cluster makes sense](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=77.34314285714285) [because each of these nodes handles a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=79.411) [subset of a request which are sent to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=81.952) [instance from an external client. if you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=84.349) [find that the single node is handling a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=86.87375) [very large subset of requests, that node](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=88.86585714285714) [will be overloaded, that's what causes](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=91.3952)[hotspotting. If you feel that the traffic](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=94.007) [to your Bigtable instance is increasing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=95.63449999999997) [and your nodes are overloaded, the way to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=97.46866666666666) [redistribute this traffic is to add more](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=100.396) [nodes to your cluster. An important point](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=102.834) [to remember and understand when you think](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=105.38799999999999) [of a Bigtable instance is the fact that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=107.28957142857145) [nodes don't actually store the data that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=109.99328571428573) [you store within Bigtable, they only](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=112.38499999999999) [contain lookup data structures which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=114.63100000000001) [enable fast access to the underlying data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=116.636) [that are stored in tablets on Colossus.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=119.2972857142857) [When you add more nodes to the Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=122.733) [cluster to handle additional traffic load,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=124.389) [the underlying data in Colossus is not](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=127.498) [moved around. The lookup structures are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=129.76266666666666) [rebalanced so that nodes get traffic](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=132.699) [evenly. Tablets in Colossus are also](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=135.95700000000005) [referred to as tablet servers and are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=138.110625) [basically consecutive records that you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=140.73699999999997) [have stored in Bigtable. And this is a big](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=142.83750000000003) [picture overview of all of the components](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=145.90966666666665)[that make up a single Bigtable instance. A](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=147.93175) [little bit about Colossus, Colossus is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=150.76100000000002) [Google's proprietary highly durable file](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=153.59300000000002) [system. The exact design and structure of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=156.6355) [Colossus is not really known to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=159.08957142857147) [external world, however, Colossus is what](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=161.35175000000007) [makes Bigtable far, far better than HBase](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=163.90699999999998) [for storage. The durability and the backup](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=166.8791428571429) [provided by Colossus is way beyond what](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=169.58228571428577) [HBase provides. HBase typically provides](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=172.90071428571432) [three-way replication of your underlying data. Colossus goes above and beyond that.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=5&mode=live&start=175.40175000000005)

[Replication](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live)

[At this point, we have a good](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=2.741) [understanding of how our Bigtable instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=4.147125) [has clusters. Clusters are made up of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=6.445857142857142) [nodes and these work with tablets. A](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=8.725625) [Bigtable instance also supports](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=11.650666666666668) [replication. Replication is achieved by](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=13.745333333333337) [having multiple clusters in the same](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=15.933666666666664) [Bigtable instance and these clusters are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=18.84066666666667) [typically in different zones. The entire](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=20.802000000000007) [cluster is replicated. The underlying](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=23.924250000000004) [data, remember, is in Colossus on tablets.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=26.3245) [Bigtable is responsible for keeping the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=29.273) [lookup data in these clusters](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=31.35) [synchronized. Additional clusters can be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=34.11333333333334) [added to your Bigtable instance at the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=35.654571428571415) [time of creation or later on after the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=37.706857142857146) [instance is up and running. When you have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=40.50699999999999) [an instance with multiple clusters, each](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=43.12328571428571) [of these clusters can serve as the primary](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=44.910428571428575) [cluster, and reads and writes can be sent](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=47.71342857142858) [to any of the clusters within a Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=50.30377777777779) [instance. Eventual consistency is achieved](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=53.54474999999999) [across clusters by default. You can also](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=56.10579999999999) [configure your Bigtable instance to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=59.90449999999999) [achieve more complex forms of consistency](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=61.61114285714286) [if that is your use case. You can have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=64.01342857142858) [read your writes consistency or strong](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=67.20714285714287) [consistency. There are settings in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=70.07933333333334) [Bigtable that you can use to configure](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=71.66949999999999) [this. Replication is a great way to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=74.24849999999999) [improve the availability of your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=76.21950000000004) [instance. When you have multiple clusters](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=78.2926) [and each cluster can serve as the primary,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=80.07557142857145) [this makes it very easy to achieve](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=82.748)[automatic failover. If one cluster is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=85.25733333333334) [down, then your request will automatically](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=87.95099999999998) [be routed to the other cluster. You can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=90.10899999999998) [also have manual failover where you're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=93.11314285714286) [explicitly routing your data to one or the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=95.21257142857142) [other cluster. Setting up replication also](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=97.87899999999999) [allows you to isolate the different kinds](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=99.74085714285717) [of applications that you might have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=102.10100000000003) [running against your instance. On the one](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=104.31150000000001) [hand, you might have an analytical](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=106.43275000000001) [processing batch job running that performs](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=108.0702) [a large number of reads on your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=110.764) [instance. On the other hand, you might use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=113.38433333333333) [the same instance to serve production](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=115.56388888888891) [graphic, which is made up of reads, as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=118.14380000000001) [well as writes. It's possible to direct](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=120.26949999999998) [each type of traffic to a different](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=122.22871428571428) [cluster in your instance. Bigtable will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=124.98249999999999) [ensure that there is almost a real time](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=127.333) [backup of all of the data. An important](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=129.9125) [piece of Bigtable's design, which gives it](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=133.483) [the ability to scale to huge data cells,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=135.8643333333333) [is the fact that it divides the data from](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=138.0852222222222) [pointers to data. The Bigtable cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=141.40500000000003) [nodes, which can be replicated, contain](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=143.83328571428572) [complex data structures with pointers to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=146.2486) [the underlying data, and the underlying](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=149.599) [data in your Bigtable instance is stored](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=151.83871428571427) [in a sorted order on leaf nodes with are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=154.16075) [present in Colossus. The lookup data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=158.33214285714283) [structures and nodes are similar to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=160.72399999999996) [btrees, and the data and colossus stored](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=162.79542857142854) [in tablets are the leaf nodes. This is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=165.51999999999998)[structure that makes it possible to get](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=168.6065714285714) [very fast scans of your underlying data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=170.260625) [provided you're accessing the data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=172.79579999999999) [sequentially or in order. In addition, in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=175.21366666666665) [order to improve performance, Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=177.93050000000002) [performs a bunch of other intelligent](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=179.4226666666667) [tasks behind the scenes. As you set up](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=182.08800000000002) [your Bigtable instance and start accessing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=185.01800000000003) [your data, Bigtable learns usage patterns](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=186.7505) [and it finds out the kind of access that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=189.4815714285714) [you need for your data. It'll identify](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=192.761)[hotspots and eliminate these hotspots by](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=195.54671428571424) [redistributing the data to best suit your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=198.58380000000005) [needs. Because of the way data is stored](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=201.6624285714285) [in Bigtable, the redistribution of data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=203.55149999999995) [only involves shuffling the lookup](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=206.35683333333338) [structures that are present in nodes, the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=208.89440000000005) [underlying data in Colossus need not be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=211.38666666666668) [moved. In addition, Bigtable will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=213.79233333333343) [periodically compact your data and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=215.67200000000005) [efficiently compress it. Engineers at](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=218.16285714285718) [SpikeySales deal with very spikey traffic](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=220.203) [patterns. Often, the Bigtable instance is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=223.47985714285713) [not loaded when we are serving just](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=225.8367142857143) [regular traffic. During sale days though,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=228.09814285714288) [their Bigtable instance might be hit with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=230.103) [a very heavy traffic load. In such](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=232.143) [situations, additional nodes can be added](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=235.10328571428573) [very easily to their Bigtable cluster.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=237.68542857142856) [They can even enable replication. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=240.124) [actual data is not moved. Only additional](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=242.427) [nodes are added making this redistribution](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=244.7081428571429) [very, very efficient. Remember that these](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=246.7655)[nodes are just virtual machine instances](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=249.71042857142854) [on the Google compute engine. The data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=252.15614285714287) [structures are stored on persistent disks.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=254.99659999999997) [So if you use SSDs, your performance will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=257.287) [be better. Cluster nodes help you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=260.22720000000004) [redistribute traffic. Behind the scenes,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=262.53799999999995) [Bigtable does more. Bigtable is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=264.4195000000001) [responsible for splitting tablets, which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=266.7606) [are larger and contain a large amount of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=269.0671428571428) [data, and which are busier because they](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=271.52375000000006) [are accessed very often. If Bigtable finds](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=274.03999999999996)[that there are smaller tablets that tend](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=276.7262857142858) [to be less busy, these tablets will then](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=279.0425714285714) [be merged together. All of this is done](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=281.9174285714285) [automatically. There is no configuration](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=285.0231666666667) [that you have to set. There is nothing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=286.5355555555557) [that you need to do. The users are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=288.72950000000003) [completely abstracted away from the tablet](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=291.2565) [structure. The one important bit of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=293.90649999999994) [control that the developer has is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=295.7362499999999) [choice of row key. If you design your row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=298.3520000000001) [key in such a manner that you're not](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=301.1289999999999) [constantly accessing the data, which is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=303.0559999999999) [stored together on the same tablet, you've](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=305.04825000000005) [done your job. When you work with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=307.85959999999994) [Bigtable, you can configure something](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=310.76200000000006)[called an application profile and this can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=312.24733333333324) [be used by clients connecting to Bigtable.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=314.7698750000001) [An application profile basically tells](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=318.4) [Bigtable how to handle incoming requests,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=320.464) [which cluster the direct request to.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=323.042) [Application profiles can be thought of as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=325.657) [the routing policy that you define in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=327.741) [multi-cluster instances. A particular](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=330.103) [client might want to be routed always to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=332.64325) [the same cluster. In such a case, a client](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=335.48380000000003) [can use the application profile that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=338.07966666666675) [directs all incoming requests to only one](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=339.926) [cluster within the Bigtable instance. An](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=343.29816666666665) [application profile can also be used to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=345.838875) [control whether atomicity at the row level](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=348.008) [is required, whether single row transactions are allowed.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=6&mode=live&start=350.999)

[Schema Design](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live)

[The most important control that you as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=2.355) [developers have over Bigtable performance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=4.118) [is how you design your schema and how you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=6.75) [design your row key. Let's start off by](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=9.012555555555554) [understanding row key design first. You](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=11.30433333333333) [know that every table in Bigtable has just](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=13.206571428571428) [one index, the row key. There are no](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=15.878285714285715)[secondary indices that you can use to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=18.566285714285705) [lookup your data. The records in your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=20.74266666666667) [Bigtable are stored in sequential order of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=22.729999999999997) [row key, which means, records which have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=25.194285714285712) [consecutive row keys might be stored on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=28.068499999999997) [the same tablet in Colossus. Make sure](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=30.68144444444445) [that you keep the row key as short as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=33.123777777777775)[possible because the row key will be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=35.227500000000006) [retrieved with every data access. Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=37.45666666666666) [really doesn't support transaction. This](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=40.6682) [is an important point to remember. It](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=42.63885714285714) [offers atomicity only at the row level. So](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=44.672875) [all of your entity information should be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=48.425125) [in a single row. If you want to write this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=50.834) [data in an atomic manner, make sure that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=53.886) [your schema is not so designed that it](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=57.247) [requires atomicity across multiple rows.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=59.755) [While writing out data, it's often](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=62.758)[possible that the write to one row will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=64.906) [succeed, but a write to another row will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=67.6405) [fail. Bigtable works very well if your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=69.97762500000002) [dataset is sparse in nature and contains](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=72.17775) [millions of records. The columnar layout](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=74.96100000000001) [of Bigtable work well with sparse data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=77.4287142857143) [because very large number of empty columns](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=80.05257142857144) [in your data will not take up additional](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=82.252) [storage space. Space is allocated only for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=85.322) [those values which are actually present](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=88.3412857142857) [and stored in Bigtable. Let's say the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=90.63249999999998)[records that you store in Bigtable have a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=92.92200000000001) [huge number of attributes, but not all](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=95.29985714285712) [records have values available for all of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=98.22714285714285) [these attributes. This is sparse data.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=100.68139999999998) [Just store the entire entity in one row.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=102.65) [If you've worked with HBase earlier, you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=106.887) [know that hotspotting is a big issue in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=108.5779) [production. Now if you have subsets of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=111.64909999999998) [your data which are very commonly accessed](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=113.30099999999997) [either read or written, those nodes will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=115.46357142857141) [be accessed over and over again, which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=118.40771428571428) [means those nodes will be overloaded, they](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=121.02857142857144) [will become hotspots. You can control this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=123.68814285714285) [by designing the row key well. If you know](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=126.18414285714285) [that certain subsets of data will be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=128.83024999999998) [accessed often, try to get the read and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=131.78371428571427) [write operations on this data distributed](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=134.21866666666673) [across nodes in your cluster. Another side](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=136.104375) [of this is that you'll get the best](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=138.536) [performance from your Bigtable if you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=140.6914285714286) [store related entities close together](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=142.578) [because they can then be retrieved](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=145.12) [together. All of this depends on how you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=147.6451428571428) [design your row key. The row key is what](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=149.66812499999992) [determines how data is distributed in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=152.628) [underlying storage. The main principle](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=155.27433333333335) [that you have to keep in mind while](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=157.23266666666663) [designing a row key is to have commonly](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=158.9957777777778) [accessed data distributed across multiple](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=161.9162) [nodes of your cluster. Let's say you're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=165.244) [using Bigtable to store offer related](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=168.127) [notifications for the customers of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=170.37580000000003) [ecommerce site and you often send out](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=172.43585714285712) [offers to customers using the alphabetical](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=175.143) [order of their names. Make sure that the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=178.058) [row key is not customer name. When you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=181.60039999999998) [send out your offers in a blast, your row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=184.37699999999998) [keys will be accessed sequentially leading](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=187.10385714285712) [to hotspotting. Here is an example of a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=189.57166666666666) [good row key. Reverse domain names make](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=192.8123333333333) [excellent row keys. This design allows](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=195.82114285714283) [adjacent rows to be related to one](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=198.26057142857144) [another. For example, all of the products](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=200.68150000000003) [of the same company will be stored](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=202.5095) [together. This means related data is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=205.33050000000003) [stored together. You should avoid reverse](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=207.704) [domain names if all of the data is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=209.6225714285714)[concentrated in just few reverse domains.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=212.21937500000004) [Here is an example of a poor row key.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=215.652) [Domain names where the variable part of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=218.586) [the domain starts first, product. company.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=221.22237499999994) [com. This makes it very inefficient to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=224.45316666666662) [fetch all products for a given company.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=226.863) [When you use Bigtable, you can fetch all](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=229.678) [of the rows which have the same prefix](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=231.97666666666657) [very, very efficiently. When the name of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=234.61) [the product, which is the most variable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=237.04766666666671) [part of the key comes first, adjacent rows](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=238.54575000000003) [have little in common. It's inefficient to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=241.45433333333335) [retrieve information that might be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=244.62159999999997) [requested together. Sequential numeric ids](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=246.965) [are a big no, no with Bigtable. When you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=249.11128571428574) [have new records, all of their IDs will be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=252.38385714285715) [close together so when you add all of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=254.77900000000005) [these new records and write it out to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=257.0775555555555)[Bigtable, this will cause hotspotting. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=259.41600000000017) [you already have sequential IDs in your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=262.30975) [data, a better way to design the row key](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=263.813) [would be to reverse the numeric ID.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=266.508) [Remember that the row key decides where](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=269.932) [data will be stored in the underlying](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=272.166) [tablets. If you have a row key that is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=274.87587499999984) [updated frequently, that will require the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=277.41855555555554) [data to be resorted. Frequently updated](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=279.8438333333334) [data is a poor choice for the row key. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=282.5771428571428) [you'd like to use timestamps as a part of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=286.00666666666666) [your row key, ensure that timestamps don't](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=288.52785714285716) [form a prefix of the row key because](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=290.6411111111111) [timestamps are sequentially increasing.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=292.77) [You can concatenate other columns that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=296.048) [should make up your row key along with the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=298.239) [timestamp. Remember to keep the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=300.67620000000005) [concatenated key as short as possible.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=302.36928571428564) [Your schema is designed, your Bigtable is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=304.756) [populated. As you use your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=307.7029999999999) [instance, you might require additional](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=309.89566666666667) [insights into usage patterns allowing you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=311.7966666666666) [to redesign your table for better](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=314.3346666666667) [performance. This is where you can use the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=316.8105999999999) [key visualizer. This is a tool that Google](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=319.2615555555554) [offers to analyze Bigtable usage patterns.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=321.6075) [The key visualizer will give you a visual](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=325.161) [report based on row key access and this is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=328.09) [a great way for you to see whether the row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=330.992) [key design that you have set up is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=333.467) [appropriate for the usage pattern on your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=335.875) [table. This will allow you to zoom in on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=339.06174999999985) [the hotspots that might exist based on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=341.05922222222233) [your traffic patterns and find those rows](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=342.9045714285714) [that contain too much data that is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=345.9108571428571) [commonly accessed. Once you identify these](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=348.9325)[unbalanced rows, you can find ways to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=351.57333333333327) [mitigate this problem. Redesigning the row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=354.106625) [keys, redesigning your schema, all of these are options.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=7&mode=live&start=356.426)

[Understanding Performance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live)

[We've already spoken about schema design](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=2.672) [to improve the performance of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=4.901428571428571) [Bigtable. Let's take a quick look at some](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=7.062166666666668) [other factors. Here is the per-node](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=9.436000000000002) [performance for a typical Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=11.411999999999999) [instance. There are three basic categories](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=13.701333333333334) [of operations that you'd perform on a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=16.024333333333335) [Bigtable instance, reads, writes, and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=17.946428571428566) [scans. You can pause and take a look at](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=21.250800000000005) [the statistics for yourself. The one thing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=23.52655555555555) [that should pop out at you though is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=25.729000000000003)[storage type has a profound impact on your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=28.019875) [performance. If you have cluster nodes](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=31.55575) [with SSDs, or solid-state drives, they](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=33.501428571428555) [will much faster than cluster nodes with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=36.07533333333335) [hard disk drives, or HDDs. The biggest](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=38.887285714285724) [advantage that Bigtable has over say HBase](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=41.970499999999994) [is the fact that it offers linear scaling.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=44.508999999999986) [Data is stored in Colossus, which is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=48.184) [Google's proprietary distributed file](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=50.1668) [system and colossus is infinitely](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=52.119285714285716) [scalable. In order to scale your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=54.840714285714284) [instance, all you need to do is to add](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=57.46014285714285) [more nodes to your cluster. Bigtable is so](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=59.902) [designed that the capacity of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=63.18771428571431) [instance scales linearly with the size of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=65.54014285714285)[your cluster. The best practice while](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=68.1905714285714) [using Bigtable is to add enough nodes that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=70.26857142857143) [your utilization is around 70%. There are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=73.12685714285712) [some factors that would absolutely kill](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=76.62133333333334) [the performance of your Bigtable instance.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=77.9756) [The first of these is poor schema design](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=80.54) [and we've spoken a lot about this. Make](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=82.855) [sure that you choose your row key well and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=85.43111111111112) [you don't store too much data per row.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=88.25611111111111) [Less than 10 MB is ideal, even though the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=90.945) [actual limit is less than 100 MB. Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=93.872) [really only works well if your data size](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=97.32385714285714) [is greater than 1 TB. If you test with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=100.06528571428572) [very small amounts of data, you'll find](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=103.029) [that Bigtable doesn't really perform well.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=104.9485) [You should also ensure that you use your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=107.547) [Bigtable instance over a longer period of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=109.247) [time. If you use your cluster for just a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=112.02424999999998) [few seconds or a few minutes, Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=114.14188888888891) [will not have the time to learn usage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=116.42325) [patterns and optimize performance. Cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=119.11600000000001) [design is also an important ingredient in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=122.0735) [improving the performance of your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=124.874) [instance. Make sure that you have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=127.08199999999997) [sufficient nodes in your cluster and your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=128.654375)[cluster is roughly at 70% utilization.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=130.17071428571427) [Design your clusters with SSDs, rather](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=132.61499999999998) [than HDDs. If you've recently made changes](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=136.95400000000004) [to your cluster, you might find that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=139.61114285714285) [performance dips for a bit. Your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=141.59083333333336) [cluster will take about 20 minutes to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=143.83750000000006) [adjust. If you're running on a development](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=146.5293333333334) [instance, which is basically just a single](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=148.19) [node cluster, your performance won't be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=150.52) [great. Your performance will also suffer](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=153.52342857142852) [if your clients are located in a different](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=155.49828571428577)[zone than your cluster. One option here is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=158.25657142857145) [to set up a replicated cluster in the same](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=160.57974999999996) [zone as your clients. Here are some](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=163.042) [recommended upper limits for the data that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=166.29700000000003) [you store in Bigtable. A single row key](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=168.50242857142854) [should be under 4 KB. The number of column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=171.13811111111113) [families per table is best below 100. A](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=174.21849999999995) [single column qualifier should be under 16](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=177.10685714285717) [KB and a single value in a table cell](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=179.8246) [should be under 10 MB. The size of a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=183.35500000000002) [single record or a single row should not](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=186.86639999999997) [exceed 100 MB and the maximum number of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=189.45300000000003) [tables that you have per Bigtable instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=192.6395) [should be 1000. This is a lot to keep in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=195.05349999999999) [mind, but remember, performance tuning is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=198.76987499999996) [an iterative process. Use these principles and tweak your performance.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=8&mode=live&start=200.902)

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The total cost of using](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=7.271600000000001) [a Bigtable instance depends on three](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=10.362125000000002) [factors, the number of nodes in your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=12.557857142857141) [cluster, the amount of storage that you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=14.95985714285714) [use, and the network bandwidth that you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=17.24614285714286) [consume. Since your nodes are always up](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=19.823999999999998) [and running, Bigtable requires class to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=22.406999999999996) [provisioning after all. Remember, you'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=24.707) [pay for your Bigtable instance even if](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=26.241333333333333) [it's not serving queries. The cost of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=28.730571428571423) [nodes, which are just VM instances vary by](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=31.70288888888889) [region. For every hour, find the maximum](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=34.788999999999994) [number of nodes in existence in that hour](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=36.971000000000004) [and multiply that by the hourly rate for a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=39.85514285714286) [node. Storage costs vary based on whether](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=43.51000000000001) [you're using hard disk drives or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=45.73771428571428)[solid-state drives. Solid-state drives, or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=48.504571428571424) [SSDs, have better performance, but higher](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=50.504000000000005) [cost. And both SSDs and HDDs are far more](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=53.39116666666666) [expensive as compared with cloud storage,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=57.13) [which offers blob storage. Calculating how](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=60.067) [much networking costs is a lot more](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=63.013000000000005) [difficult. There's lots of fine print](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=65.33399999999999)[involved. Remember ingress to GCP services](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=67.16199999999999) [is always free. Egress has standard rates](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=69.845625) [applicable. These rates will vary by geography.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=9&mode=live&start=73.75919999999999)

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We'll log onto the GCP first.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=12.029) [Go to console. cloud. google. com and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=15.058) [specify the username for your GCP account](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=17.91225)[and specify the password. And remember,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=20.384000000000007) [GCP is available free for anyone with a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=22.64414285714286) [Gmail account, or if you have a G suite](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=25.286999999999995) [account that belongs to your organization,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=27.880375000000004) [you can use that to set up a GCP account](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=29.117333333333335) [as well. All of the resources that you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=32.429) [provision on the GCP live within a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=34.371750000000006) [project. A project is a logical grouping](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=37.12566666666667) [of resources, which is also a billing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=39.07728571428573) [unit. Spikey-bigtable is the project that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=42.27357142857143) [I'm currently working on. You can use that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=44.72083333333332)[drop-down on top to switch projects if you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=47.63688888888888) [want to. Make sure that you have billing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=50.2998) [enabled on your project. You'll need that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=53.050714285714285) [in order to be able to work with Bigtable.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=54.90724999999999) [You can get quick access to all of GCP](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=57.634) [services by clicking on the hamburger icon](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=60.076) [off to the top left, this will bring up a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=62.468)[Navigation menu, which you can use to move](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=64.6) [around the web console. We start off by](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=67.184) [enabling the APIs that we need to work](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=70.10833333333333) [with Bigtable. Go to APIs and Services and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=72.2902) [choose Library. This will bring up a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=75.76650000000001) [search box where you can type in the API](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=77.78133333333336) [that you want to access. We'll first](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=80.39799999999998) [enable the cloud Bigtable API. This is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=82.98771428571428) [API that needs to be enabled so that you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=85.72339999999998) [can read and write contents to your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=87.89775) [Bigtable instances. Click on the Enable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=90.78266666666667)[button and wait for a few seconds until](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=93.25150000000001) [the API is enabled. You can use the search](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=95.96000000000001) [box on top here to search for APIs or you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=98.81199999999998) [can head back to the main APIs and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=101.12049999999998) [services library page. The second API that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=104.12150000000003) [you need to enable is the Cloud Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=106.99566666666665) [Admin API. This is what allows you to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=109.62540000000001)[administrator Bigtable instances and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=112.28700000000003) [clusters. Click on Enable and wait for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=114.10775) [this API to be enabled. There is one last](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=116.98718181818184) [API that you need to enable, that is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=119.8608888888889) [Cloud Bigtable Table Admin API. This is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=122.40666666666667) [what you need to create and manage tables](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=125.24677777777781) [within your Bigtable instance. Click on Enable and wait for this API to be up.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=10&mode=live&start=128.76260000000002)

[Creating a Bigtable Instance Using the Web Console](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live)

[Use the hamburger icon on the top left to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=2.516) [bring up the navigation menu and let's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=4.68) [head over to Bigtable to create our first](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=6.632125000000001) [instance. The big blue button here will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=9.857999999999997) [allow you to get started. Remember that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=11.761) [your Cloud Bigtable instance is just a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=14.134285714285715) [container for your clusters and nodes. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=16.55671428571429) [data is stored in Colossus. Choose a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=19.501) [meaningful name for your instance. This is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=22.338) [just for display purposes, but allows you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=24.281000000000002) [to identify this instance. Every instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=26.495571428571424) [has a unique ID and this is permanent and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=28.537666666666663) [cannot be changed. The next choice that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=31.5198) [you need to make is the instance type. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=33.87866666666668) [you're setting up a Bigtable instance to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=36.27750000000001) [serve real world production data, you'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=38.63399999999999) [go with production, otherwise, you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=41.183) [choose development. A Bigtable cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=44.22579999999999) [within your production instance should](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=46.397499999999994) [have a minimum of three nodes. Production](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=48.08225) [instances are also more expensive. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=50.523666666666664) [default configuration for a production](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=53.52166666666666) [instance will set you back almost $1600 a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=55.195) [month. You can see that the main component](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=59.33011111111109) [of the cost here is the three-node cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=61.08522222222223) [that you have to have up and running at](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=63.49357142857142) [all points in time. In order to extract](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=65.4893333333333) [the best performance from your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=67.75575000000003) [instance, production clusters are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=69.617) [typically configured using SSDs, or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=71.76500000000003) [solid-state drives. Those also are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=75.122) [expensive. You can always change the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=78.45424999999999) [number of nodes in your Bigtable instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=80.27374999999998) [at any point in time, but the storage type](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=82.00349999999997) [you choose is permanent. If you switch](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=85.61211111111108) [over to HDDs for your nodes, you'll find](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=88.54766666666667) [that the cost drops down to $26 per month,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=90.98766666666668) [rather than $170 for month for storage.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=94.24744444444444) [We'll stick with HDDs for our test](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=97) [instance. Let's scroll down and take a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=99.06850000000003) [look at the actual cluster. This is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=100.92400000000004) [only cluster in our instance so far. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=103.68799999999997) [default ID is the instance ID suffix is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=106.2394) [c1. You can choose a region where your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=110.61060000000005) [cluster nodes will live. I'll just go with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=112.89650000000003) [us-central1. Regions on the GCP span a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=117.16562500000002) [geographical area and regions are made up](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=120.6425) [of multiple zones. Once you have your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=123.52625000000002) [region selected, you now need to select a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=125.72533333333332) [zone where your nodes will live. I'll just](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=127.56600000000003) [choose us-central1-a. A zone on the GCP is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=131.1204285714285) [similar to an availability zone on AWS and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=133.73699999999997) [can be thought of as a single data center.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=136.08787500000003) [It's recommended for a production cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=139.593)[to have three nodes. We'll leave this as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=141.318) [three and click on Done. You've configured](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=143.9947777777778) [your Bigtable cluster. If you're planning](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=146.3916) [on having your Bigtable instance serve a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=148.76057142857144) [lot of traffic and you want automatic](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=150.60574999999997) [failover, you'll enable replication. Any](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=153.19033333333334) [replicated cluster that you add for this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=156.12871428571427) [Bigtable instance should be in a different](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=158.30485714285714) [zone so that failover is possible. You](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=160.18114285714285) [need to ensure that you choose a region](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=162.85322222222223) [with multiple zones. If you want to have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=164.975) [replication enabled for Bigtable, you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=168.07000000000002) [add a replicated cluster at the time of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=170.02471428571428) [instance creation or later on. The second](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=173.58344444444438) [replicated cluster automatically gets an](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=176.5726) [ID with the suffix c2. Cancel out of this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=178.6727142857143) [and let's play around with the config](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=182.16750000000005) [settings a little more. Let's switch from](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=184.05785714285716) [a production to a development instance. A](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=186.037) [development instance is cheaper than a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=189.24733333333333) [production instance. This is what you'd](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=191.40233333333333) [use for prototyping and testing. You can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=193.24166666666665) [upgrade this to a production instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=195.17585714285715) [later on. It has just the 1 node and will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=196.82287499999998) [cost about $500 a month. You can see that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=200.21812500000004)[replication is not enabled for development](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=203.65900000000002) [instances. I'll go with a development](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=206.35500000000002) [instance for now, but I'll choose storage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=208.14385714285712) [type SSD. The total cost per month for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=211.13585714285713) [this instance is $644. Click on Create,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=213.6367142857143) [and wait for your Bigtable instance to be up and running.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=11&mode=live&start=217.399)

[Editing a Bigtable Instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live)

[Now that we've created our first Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=0) [instance, let's explore a few options.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=4.167666666666667) [Select the instance and this will open up](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=6.31) [the Info panel to the right side of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=8.599) [screen. This is the panel that you can use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=11.767000000000003) [to manage who has permissions to your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=13.582111111111118) [Bigtable instance. You can add other users](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=16.268499999999996) [in your organization who can access this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=18.418714285714284) [instance and associate roles with them.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=20.95583333333333) [These roles may allow them to create](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=23.934) [tables, just do instances, anything. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=26.143) [you scroll below, you'll see the service](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=29.02075) [account that has administrative access to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=30.937) [Bigtable instances. There is just one](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=33.73166666666667) [member here. You can use the Labels tab](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=36.027666666666676) [here to associate labels with your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=38.050500000000014) [Bigtable instance. Labels are metadata](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=40.48766666666668) [associated with any resource on the GCP](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=42.796) [and labels can be used to group resources](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=45.537666666666674) [for billing or other purposes. Hide this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=48.73625) [Info panel and click through to your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=51.76075) [Bigtable instance to explore further. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=54.356833333333334)[Overview page here gives you a quick look](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=57.609875) [at the performance for your instance. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=59.774142857142856) [haven't really performed any operations.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=62.225) [Our instance doesn't really have any data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=63.915) [yet so there are no performance metrics](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=66.168) [available. Notice that under the CPU](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=69.12724999999996) [utilization field you get the average](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=71.81571428571425) [utilization and the utilization for your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=73.7385714285714) [hottest node. This allows you to quickly](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=75.87079999999999) [identify hotspots. The monitoring tab will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=79.09899999999998) [give you a quick view to graphical](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=81.02950000000001)[visualizations of how your instance is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=83.4505) [being used. You can get metrics for the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=85.8906) [instance, tables within the instance,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=88.38071428571426) [application profiles that you create, and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=89.797) [replication metrics as well. You can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=92.54299999999999) [perform meaningful grouping actions to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=95.63499999999999) [view your metrics, and you can also view](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=97.6028888888889) [charts for a number of different metrics.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=100.034) [There are 13 selected metrics here, CPU](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=102.713) [utilization, error rate, failovers, write](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=104.8522) [requests, read requests, roles written, a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=107.761)[whole bunch of detail. Once you created](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=110.29728571428572) [your instance, there are a few settings](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=112.50212499999999) [that you can edit. Click through to edit](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=114.21866666666668) [instance. You can change the name of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=116.53280000000001) [instance, you can go from development to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=118.54825000000004) [production, and once you're in production,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=120.85985714285711) [you can add replicated clusters. You can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=122.35)[also change the size of the hard disk](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=125.14022222222222) [associated with your nodes. You can try](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=127.24940000000001) [another size and see how the costs change.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=129.83462500000002) [The choice of storage type for our nodes,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=132.50214285714284) [which in our case is SSD, is permanent.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=135.50677777777776) [We've made a few changes here, click on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=138.38242857142856) [Save and your instance configuration will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=141.5115714285714) [be updated. You can delete this Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=144.12440000000004) [instance by clicking on the Delete](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=146.75757142857142) [Instance link. Specify the name of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=149.05900000000003) [instance, confirm, and your instance will be deleted.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=12&mode=live&start=151.81585714285717)

[Creating a Bigtable Instance Using the Command Line](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live)

[In this demo, we'll see how we can create](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=2.644) [a Bigtable instance using the gcloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=4.514200000000001) [command line utility. This is useful if](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=7.346) [you want to script the creation of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=10.179666666666668) [instance. You can use the gcloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=12.86) [command-line utility from your local](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=15.085428571428576) [machine by downloading the gcloud SDK.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=16.585500000000003) [Another option which works very well is to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=18.677) [use the CloudShell. The CloudShell is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=21.798142857142857) [essentially an ephemeral VM that GCP](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=23.926000000000002) [offers us on the cloud. This comes](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=26.102125000000004) [preinstalled with all of GCP's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=28.593142857142855) [command-line tools and utilities and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=30.241) [offers you a terminal window on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=32.411) [browser. Click on the full screen button](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=36.05842857142858) [to the top right in order to expand your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=37.79466666666668) [CloudShell window. I'm also going to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=40.81600000000001) [change my prompt so that I have more space](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=42.575444444444436) [for my commands. This is completely](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=44.775142857142846)[optional. If you're working on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=46.7425) [CloudShell, then this particular step is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=48.56516666666667) [not needed for you. If you're working with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=50.393444444444434) [gcloud on your local machine, you'll need](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=52.4655) [to authenticate yourself before using](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=54.72339999999999) [gcloud. Run gcloud auth login on your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=57.259499999999996) [terminal window, follow through with the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=60.06900000000002) [steps, and then you can get started. On](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=62.50983333333332) [the CloudShell, we can directly get to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=65.374) [creating our Bigtable instance called](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=67.621) [gcloud beta bigtable instances create. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=69.846) [ID for our instance is spikey-offers-dev.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=73.88842857142856) [The cluster ID within this instance is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=77.599) [spikey-offers-dev-c1. The standard](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=80.009) [practice is to use the instance ID as a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=82.9277142857143)[prefix and c1, c2, etc, as the suffix.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=85.8005) [We'll have our cluster nodes located in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=88.66750000000002) [the us-central1-b zone. The display name](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=91.93) [for our instance is the same as our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=94.44112499999999) [instance Id, spikey-offers-dev. We want](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=97.16550000000001) [our cluster to have SSD disks for storage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=99.40800000000002) [and the instance type is development. This](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=101.97085714285714) [will cause our instance to be created with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=105.38362500000001) [one node in the cluster. Wait for the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=107.26383333333334) [cluster to be up and we can now switch to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=109.6319) [the web console and confirm that yes](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=111.841625)[indeed, we do have a Bigtable instance and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=114.029) [you can see it right here. Click through](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=116.2825) [to the instance, you'll find the Overview](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=118.9312) [page showing you the clusters within this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=120.506) [instance. Click through to the cluster and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=122.76160000000002) [you'll be able to edit your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=124.73250000000003) [instance. Confirm that all of the settings](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=127.65766666666664) [for this instance are the ones that you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=129.45924999999994) [specified using gcloud. Things seem to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=132.121) [look good overall. We've created our first](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=136.15099999999995) [Bigtable instance using the command line.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=138.88499999999996) [And with this, we come to the very end of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=141.685) [this introductory model on Bigtable. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=143.409) [saw that Bigtable has been specifically](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=146.49771428571427) [designed to handle very large sparse](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=149.064) [dataset and it offers extremely low](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=151.787) [latencies for both read, as well as write](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=154.405) [operations. You would choose to use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=157.75433333333334)[Bigtable if you're storing petabytes of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=159.68050000000002) [data and want NoSQL access. Bigtable works](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=161.77037500000003) [best with natural ordered data. Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=164.82485714285716) [is often compared to HBase from the open](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=167.868) [source world, however, Bigtable offers](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=170.72439999999997) [linear scaling with the size of your data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=172.74966666666668) [and that's something which is hard for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=175.81900000000002) [HBase to achieve. We got a big picture](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=178.37499999999994) [understanding of the architecture of a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=180.58825000000004) [Bigtable instance. We saw that cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=182.69079999999997) [nodes serve as lookup data structures and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=185.01099999999997) [the actual data is stored in tablets on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=187.3894285714286) [Colossus, which is Google's proprietary](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=190.29559999999995) [data storage system. Bigtable can offer](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=192.26442857142862) [you amazing performance provided you use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=194.598) [it well. Ensure that your schema design](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=196.9014) [and especially your row key design is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=199.3558333333333) [optimized to provide hotspots any other](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=202.52742857142857) [performance pitfalls. In the next module,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=205.89785714285713) [we'll be very hands on. We'll see how we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=208.2347777777778) [can connect to Bigtable using the HBase](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=210.81399999999996) [shell, cbt, which is Google's command-line](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=213.54399999999998) [tool, and also using Python client libraries.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=a52afca8-b6cc-4669-8632-3e1b166a19d6&clip=13&mode=live&start=215.97000000000006)

[Interacting with Cloud Bigtable Using cbt and the HBase API](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live)

[Module Overview](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live)

[Hi, and welcome to this module where we'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=0) [connect to our Bigtable instance, create](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=4.854) [tables, and work with data in tables using](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=7.035000000000001) [cbt and the HBase API. If you're working](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=10.095444444444446) [with Bigtable on the GCP, you're most](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=13.092428571428572) [likely to use the command-line tool called](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=15.368142857142862) [cbt. The way I remember it is I assume it](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=17.92128571428571)[stands for Cloud Bigtable, even though](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=20.429) [it's not explicitly specified so anywhere.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=22.15357142857142) [You can also use the HBase shell in order](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=25.182) [to connect to Bigtable if HBase is what](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=28.403) [you're familiar with and you like a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=30.409) [familiar interface. We'll also see how you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=32.557) [can import data into Bigtable using these](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=35.04744444444445) [same sequence files. This is especially](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=37.4405) [important if you're migrating from an](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=39.498999999999995) [on-premises datacenter where you'll be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=41.8456) [using HBase. You can export data from](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=44.1132) [HBase as sequence files and import this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=46.16037500000001) [data into Bigtable to get set up quickly.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=48.22599999999999) [If you're interacting with Bigtable as a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=51.12414285714287) [developer, you're likely to use client](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=53.41539999999999) [libraries and higher level programming](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=55.49785714285714) [languages. We'll see how you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=57.63449999999999) [programmatically access records in Bigtable using Python.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=0&mode=live&start=59.80283333333335)

[Connecting to Bigtable Using the HBase Shell](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live)

[In this demo, we'll see how you can create](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=2.288) [and manage tables within your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=4.307) [instance and work with data stored within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=6.791) [them using the HBase shell. We start this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=8.999) [demo off in the CloudShell terminal](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=12.289000000000001) [window. Run gcloud auth](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=14.689666666666668) [application-default login in order to get](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=17.272199999999994) [application default credentials, which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=20.13633333333333) [will allow me to access client libraries](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=21.402428571428572) [from within CloudShell. This will also](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=23.6468) [enable you to access other GCP services](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=26.258375000000004) [and resources. This will ask you for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=29.012500000000003) [confirmation. Yes indeed, you do want to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=31.62766666666666) [continue. You need to click on this URL](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=33.735142857142854) [here that will take you to a page where](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=35.8158888888889) [you log in using your GCP account. It'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=38.23889999999999) [ask you for permissions to access Google](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=41.11228571428571) [Cloud Platform services. Click on Allow](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=43.686) [and this will lead you to a verification](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=45.617666666666665) [code. Copy this verification code and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=47.903) [paste it into your terminal window. Hit](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=50.12528571428572) [Enter and you are authenticated. Client](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=52.85733333333333) [libraries on the GCP use an authentication](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=56.10057142857143) [method that uses application default](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=58.093) [credentials. Application default](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=61.202) [credentials are now available within your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=62.82119999999999)[CloudShell. We'll now run a gcloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=65.757) [component update to ensure that gcloud has](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=67.92912500000003) [the latest components. Yes, all components](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=70.53914285714285) [are up to date. We're now ready to get](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=72.64342857142856) [started with the HBase shell. For this,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=75.22914285714289) [you'll need to clone a repository from](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=77.49212500000002) [github. com. This is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=80.42966666666666) [GoogleCloudPlatform](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=82.94225) [cloud-Bigtable-examples. git repository.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=83.459) [Once this repository has been cloned onto](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=87.188) [your CloudShell VM, cd into the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=89.32) [cloud-bigtable-examples QuickStart folder.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=91.396) [There is a script here in this current](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=95.178) [working directory called quickstart. sh.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=96.677) [Execute the script and that will set up](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=99.738) [your HBase shell, connect to Bigtable. So](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=102) [how did this know which Bigtable instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=106.0232857142857) [to connect to. We have just the single](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=107.754) [instance associated with our project and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=110.66914285714286) [that was the instance this connected to by](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=112.635) [default, our spikey-offers-dev instance.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=115.108) [If you have multiple Bigtable instances,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=118.105) [you'll be prompted for the instance ID.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=120.136) [You simply type it out at that prompt and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=122.43) [it'll connect to that instance. Our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=124.792) [spikey-offers-dev instance that we had](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=127.69633333333334) [created earlier doesn't have any tables](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=129.478) [here. Run a list command to confirm this. There are no tables, no rows.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=1&mode=live&start=131.27628571428573)

[Creating Tables and Adding Rows](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live)

[Within the HBase shell, let's create a new](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=3.127) [table within our Bigtable instance. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=5.486) [call this table the customer\_offers table.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=7.9154285714285715) [This table has two column families, the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=11.158) [customer family and the offer family. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=14.09842857142857) [customer family contains customer related](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=16.6614) [information, the offer family contains](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=18.307000000000002)[offer related information. Column families](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=20.26625) [are used to group together logical data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=22.57857142857143) [that are typically accessed together. Our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=25.247571428571426) [first table seems to have been created](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=27.79488888888889) [successfully. If you run a list command on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=29.831111111111124) [this shell, you'll find that we now have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=32.45611111111112) [one table in our Bigtable instance. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=34.641) [now add a record to the table using the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=37.342) [put command, put into the customer offers](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=39.62466666666667) [Bigtable. The table name comes first. Next](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=43.05933333333333) [up is the row key for that table. This is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=45.81444444444445) [the unique identifier on which all of our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=48.681749999999994) [table records are indexed. We're only](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=51.526) [writing in one value for this record here.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=53.646857142857144) [Within the customer family, we want to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=56.43600000000001) [write in the customer\_id column. You](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=59.35333333333334) [identify a column by specifying the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=62.03942857142857) [column\_family: followed by the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=64.016)[column\_name. If you write data to Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=67.55119999999998) [using the HBase client, column families](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=69.8555) [created using this client retain only one](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=71.97899999999998) [version of each value by default. Multiple](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=74.72587500000003) [versions are not stored. Let's use the put](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=77.4556) [command once again to add another value](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=80.53666666666669) [for the same record as specified by the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=82.32528571428571)[unique row key. We add a value for the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=85.26000000000002) [offer text, which is within the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=88.0625) [customer\_family column. Observe how we add](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=90.47766666666666) [column names on the fly. We specify one](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=93.04888888888888) [more value for the same record as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=96.00237499999999) [identified by the unique row key. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=98.21424999999999) [specify the offer\_image, which is within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=100.7075) [the customer\_family. We now have a table](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=103.6832) [with a single record with a bunch of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=106.14522222222223) [values within that record. Let's take a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=108.54650000000002) [look at all of the records and customer](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=110.37729999999999) [offers by calling the scan command. And](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=112.26642857142856) [here is the single record that we just](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=115.4361) [added. It has three values within three](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=117.68489999999996) [different columns. Observe that the row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=120.76499999999997) [key is the same for this record so it's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=122.90400000000001) [one single record, even though it's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=125.78749999999998) [formatted to be in three different](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=127.57400000000001) [lengths. All of the column values that we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=129.66866666666667) [added belong to the same column family, a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=131.76750000000004) [customer family, and these are the name of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=134.084875) [the columns, customer\_id, offer\_image, and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=137.2136)[offer\_text. Let's edit the same record and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=139.37757142857143) [use the put statement to add in a couple](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=142.46466666666666) [of more values, this time, these columns](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=144.36266666666666) [belong to the offer\_family, the offer\_id.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=146.54960000000003) [We'll update the same record now with one](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=150.321) [more column value. Within the offer](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=151.935) [family, we specify the product\_id to which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=154.012) [this offer applies. The way we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=156.535) [individually add columns into this record](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=158.995) [to show you how Bigtable is sparse in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=161.59) [nature. Within the offer\_family, we add in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=164.15088888888894) [the sale column, now the discount column,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=165.9065) [and now the buy\_one\_get\_one\_free column.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=168.713) [And finally, we add in an end timestamp](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=172.023) [for this offer under the offer family. All](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=174.297) [of the records in this table need not have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=177.05355555555556) [values for all of these columns. Let's run](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=179.52414285714283) [a scan on our customer\_offers table, which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=183.5058571428571) [will retrieve all of the records. We just](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=185.58) [have the one record identified by the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=187.77299999999997) [unique row key. We've added three columns](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=189.99471428571428) [on the fly to the customer\_family](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=193.97285714285712) [column\_family and we've added about five](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=195.856) [or six columns on the fly to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=198.4985714285715) [offer\_family. This particular record](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=202.23162499999992) [happens to have six columns within the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=203.704) [offer\_family. It's not necessary that all](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=206.30075000000002) [records will have the same. The way we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=208.08885714285708) [interacted with Bigtable here makes it](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=210.69324999999995) [very clear that data in Bigtable is in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=212.7875) [form of key value pairs where the key is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=215.43988888888887) [basically the row key, column family, and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=217.84937499999995)[column name combination. If you don't want](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=221.06828571428574) [people to access your table or modify data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=223.88300000000004) [within it, you can disable a particular](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=226.31666666666663) [table by calling the disable command on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=228.50357142857138) [it. This causes the table to be disabled](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=231.33816666666667) [in memory only. If you want to get rid of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=233.915) [a table, you need to drop the table. Drop](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=236.254)[customer\_offers will get rid of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=238.663125) [table. You can run the list command here](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=241.17787500000006) [and see that the table no longer exists.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=243.4706666666666) [No tables are returned, and you can exit](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=246.449) [from the HBase shell by simply typing in exit at your shell prompt.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=2&mode=live&start=248.795)

[Using the cbt Tool to Work with Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live)

[The GCP offers its own command-line](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=2.229) [interface to work with Bigtable, it's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=4.234) [called cbt and it's written using the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=5.973) [Golang programming language. In this demo,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=8.038) [we'll see how we can use cbt to create](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=11.115899999999998) [tables within Bigtable, add records, and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=13.517000000000001) [work with Bigtable in general. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=16.121) [CloudShell VM comes with cbt preinstalled.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=18.663714285714285) [If you're working on your local machine](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=21.29) [though, you need to explicitly install cbt](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=22.796) [which you can do by running gcloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=25.292)[components install cbt. You can see here](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=27.28) [that all components are up to date, which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=31.20966666666667) [means we have cbt. The cbt tool has its](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=33.38128571428571) [own profile settings file, the. cbtrc.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=36.424000000000014) [It'll pick up configuration settings from](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=39.0575) [this file, so it's best to update this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=41.733) [file with the settings that you want to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=44.08966666666669) [use to connect to your Bigtable. Our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=46.0365) [current project is the spikey-bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=48.31071428571429) [project. Try out your project id in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=50.426) [form of a key value pair. Project is equal](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=52.38219999999998) [to project id. Append additional useful](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=55.337) [configuration parameters such as the name](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=58.033) [of the Bigtable instance to which you want](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=60.234) [to connect. That is the spikey-offers-dev.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=62.59) [You can use the nano editor to edit and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=64.58916666666667) [view the contents of this file. You can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=68.61485714285713) [see that we have project is equal to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=70.6721111111111) [spikey-Bigtable, instance is equal to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=72.78820000000002) [spikey-offers-dev within here. Hit Ctrl+X](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=74.279) [and exit the editor. We'll now create the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=77.28766666666667) [same customer\_offers table that we had](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=81.08233333333332)[created using the HBase shell earlier.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=82.95157142857141) [This time, we'll use cbt call, cbt](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=84.664) [createtable customer\_offers. Cbt allows](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=87.46600000000001) [you to pre-split your table at the time of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=89.96900000000001) [creation based on row keys. This is a way](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=93.01625000000001) [for you to spread the load across multiple](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=96.00800000000002) [nodes evenly. Bigtable will automatically](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=98.458) [split the data as more rows are added.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=100.812) [This is just an initial split. The row key](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=103.302) [that you specify in the splits flag are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=105.89133333333335) [split boundaries. All rows in the first](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=108.4455) [row key will be in one location. Then the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=111.26966666666667) [rows between the first and the second row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=114.17024999999998) [key will be in the second location and so](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=116.14099999999999) [on. When you execute this command, you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=119.08979999999998) [might see a warning that says creds flag](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=120.92985714285714) [unset. We'll use gcloud credentials. In](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=123.18299999999999) [CloudShell, we do not need to specify](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=125.89) [credentials using this -creds flag. You](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=127.969) [can ignore this warning for now. In just a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=131.0992857142857) [little bit in a later clip, I'll show you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=133.36333333333337) [how you can specify credentials using this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=135.63757142857145)[flag. Running the cbt ls command will show](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=138.34) [you the tables that are available in your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=140.83124999999998) [Bigtable instance. There's just the one](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=143.10033333333334) [customer\_offers table. We can confirm that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=145.77566666666667) [this is true by switching over to our web](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=147.54399999999998) [console and heading over to the Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=149.49485714285711) [page. This is our spikey-offers-dev. I'm](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=151.4875)[going to switch to the Monitoring tab](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=154.144125) [within this instance. Use the drop-down](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=156.182) [here to view metrics for tables rather](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=159.01387499999996) [than for instance. And here you can see](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=161.8034) [the write requests and the read requests](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=164.5996666666666) [that you made to our table. If you scroll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=166.7903333333333) [down to the bottom here, you'll get more](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=169.58812499999996)[information about the tables that were](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=171.3545) [read. You can see that the table id access](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=173.1125) [was customer\_offers. The cluster id that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=175.48266666666666) [was used to access this table is the only](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=177.83577777777774) [cluster available in this dev instance.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=180.3487142857143) [We've created a table customer\_offers,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=182.66299999999998) [let's create a column family within this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=185.0592) [table. We're going to create the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=188.34500000000003) [offer\_family first. Hit Enter, and our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=190.48271428571434) [column family has been created. We'll now](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=192.48522222222226) [create the second column family that is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=194.71471428571425) [the customer\_family. This time we'll add a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=196.98) [third column family to customer\_offers](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=199.171625) [that is the product\_family. Now if you run](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=201.09249999999997) [a cbt ls command, that'll show you the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=204.36974999999998) [customer\_offers table along with the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=206.737) [column families that exist in that table.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=208.8253333333333) [Every column family in Bigtable is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=211.848) [associated with a garbage collection](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=213.226) [policy. By default, tables which are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=215.7435) [created using cbt will read in an infinite](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=218.0605714285714) [number of versions for every column in all](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=221.05700000000002) [column families. Even if you specify new](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=225.37124999999995) [values for columns, the old values are not](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=228.28075) [deleted. This is why unless you change](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=231.86666666666667) [your garbage collection policy associated](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=234.28199999999998) [column families, the size of your table](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=236.29325000000003) [can keep growing. Let's delete one of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=239.16399999999993) [column families that we created using the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=241.60214285714284) [cbt deletefamily command. Within the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=244.24937500000004) [customer\_offers table, we'll delete the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=246.2115) [product\_family. Running a cbt ls command](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=249.284) [to show you, we just have two column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=251.44687500000006) [families now, the customer\_family and the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=253.94471428571424) [offer\_family. We can use the cbt](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=256.809) [setgcpolicy command to set a garbage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=259.731375) [collection policy for a particular column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=262.2638571428571) [family. Here we want columns within the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=264.951) [offer\_family to retain a maximum of three](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=267.052) [versions of any value stored. The three](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=269.975)[latest versions will be retained, the rest](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=273.58785714285716) [will be deleted. You can also specify a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=276.212) [garbage collection policy based on days.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=278.8899999999999) [The offer\_family will retain its values](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=281.582) [for a maximum of three days. Individual](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=284.175) [column families can have their own garbage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=286.93600000000004) [collection policy. Here, I've set the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=289.384) [customer\_family to max versions 3 and I've](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=291.444) [now updated it to be maxage 3 days. If you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=293.4597777777779) [now run the ls command on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=296.84977777777766) [customer\_offer's table, you'll see the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=299.91540000000003)[individual column families along with the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=301.9395) [garbage collection policy associated with each column family.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=3&mode=live&start=304.0965)

[Writing and Reading Records Using cbt](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live)

[We have our table and column family set](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=2.57) [up, we're now ready to add in some data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=4.528222222222221) [called cbt set on the customer\_offers](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=6.541) [table. The first argument is always the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=9.177000000000001) [row key that uniquely identifies our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=10.959) [record. We can specify multiple key value](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=13.536800000000003) [pairs to update all of our record fields](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=16.11075) [in one go. Here is the value for the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=19.055333333333337) [offer\_id within the offer\_family and here](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=21.685750000000006) [are all the other values. We have the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=23.73077777777777) [product\_id, sale, discount,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=26.8015) [buy\_one\_get\_one\_free, and end\_timestamp,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=27.94) [all of which belong to the same](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=30.42) [offer\_family. We'll now use the cbt set](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=32.09614285714286) [command to add in a new record for a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=34.93511111111111) [different customer. This customer has the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=37.54933333333334) [row key which starts with AA. Here is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=39.66114285714287) [value for the offer\_id column within the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=42.40833333333334) [offer\_family. Observe that not all of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=45.842) [other columns within the offer\_family are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=48.895499999999984) [set. There are some columns with missing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=51.22620000000001) [values and that's totally fine. There are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=53.17114285714285) [no values for the sale column and the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=55.690888888888885) [buy\_one\_get\_one\_free column. Add in a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=57.994) [record for a third customer whose row key](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=60.35433333333333) [starts with KB. The cbt read command is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=63.213800000000006) [the equivalent of scan in HBase. This](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=66.59875) [allows you to read all of the records](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=68.5688888888889) [within the customer\_offers table. Observe](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=71.33528571428569) [that the records are displayed in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=73.4312857142857) [sequential order of a row key. A record](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=75.27485714285714) [with the prefix AA in the row key is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=78.309) [displayed first. The record for the row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=81.425875) [key that starts with CG is displayed](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=83.784) [second. Observe that for every value in a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=86.31625000000001) [cell, there is an associated timestamp.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=88.61349999999999) [And finally, the third record is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=91.477)[record which has the row key starting with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=93.80887499999997) [KB. The records were added in any order](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=96.19212499999996) [they are stored sequentially within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=98.13) [Bigtable. You can use the cbt deleterow](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=100.58340000000003) [command to delete a row with a particular](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=103.06250000000003) [row key. This will get rid of that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=105.27225) [customer who has the record starting with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=107.629) [the row key KB. If you now run a cbt read](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=109.95) [on the customer\_offers table, you'll find](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=113.36611111111112) [that we have two records, the one starting](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=115.357) [with AA and the one starting with CG. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=117.90849999999998) [third one has been deleted. We'll now](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=120.821) [update some of our existing rows using the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=123.49775) [cbt set command. We'll add in some column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=126.2782) [values in the customer\_family. Here is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=128.90957142857144) [update for one record and here is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=132.35733333333334) [update for the second record. Now if you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=134.84142857142857) [run a cbt read command on customer\_offers,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=137.78199999999998) [you'll find that both records now have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=139.786) [their updated values. If you switch over](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=143.165) [to your web console, and view the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=145.53600000000003) [Monitoring tab for your Bigtable instance,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=147.1517142857143) [you'll be able to see the additional](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=148.636) [writes and reads in the visualizations here.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=4&mode=live&start=151.00566666666666)

[Using a Service Account to Authenticate to Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live)

[The -cred flag warning when we use cbt](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=2.537) [with the CloudShell was annoying. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=5.082777777777779) [you're working with gcloud from your local](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=7.353000000000001) [machine, you'll have to set the -creds](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=8.82) [flag. This requires us to set up a service](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=11.2485) [account with access. Use the Navigation](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=14.908999999999999) [menu and head over to APIs and Services](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=16.993000000000002) [and go to the Credentials submenu. Click](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=19.63333333333333) [on the blue Create credentials button in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=22.559285714285714) [order to create a new service account key.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=24.821666666666665) [This will take you to a page where you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=27.307) [fill in various details. You first need to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=29.249200000000013) [select the service account. I want to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=31.016) [create a new one. I don't have one right](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=32.99800000000001) [now. I'll call it the Spikey Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=35.35649999999999) [admin account and I'll select a row. I](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=37.57242857142859) [want this account to be a cloud Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=40.6567) [administrator. An administrator has full](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=43.71030000000002) [access to all Bigtable resources. You can,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=45.44199999999999) [of course, choose a more limited role if](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=47.995749999999994) [you want to such as Bigtable reader, user,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=49.975500000000004) [or viewer. I cleared and download this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=52.7365) [credentials key in the JSON format, that's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=55.80714285714285) [the option that I've chosen. When you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=57.92714285714287) [click on Create, a key will be downloaded](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=59.49657142857144) [to your local machine. Make sure that you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=61.55514285714286) [save this key safely to a directory where](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=64.086) [you can then access it. Having created our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=66.454) [service account successfully, we can head](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=69.1004) [over to our CloudShell terminal window.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=70.80285714285714) [I'm going to use the three-dot menu](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=73.939) [available at the top right of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=76.228) [CloudShell in order to upload my JSON](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=77.594) [credentials file to my CloudShell VM.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=80.682) [Select the file from your local machine](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=83.404) [and wait for this upload to complete. 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Check your current](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=89.9085) [working directory, that is the home](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=92.1264) [directory, and if you run an ls command](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=93.43333333333331)[here, you will find the credentials file.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=95.426) [Instead of passing in the -creds flag,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=98.275) [with every command that we run against our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=100.754) [Bigtable instance, I can simply add these](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=102.712) [credentials that is a reference to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=105.944) [JSON file that contains my credentials to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=108.14112499999997) [our. cbtrc. Open up the. cbtrc file with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=111.95225) [the nano editor and you'll find an entry](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=115.41599999999997) [for our credentials. It's pointing to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=118.17466666666671) [JSON file which has our service account](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=120.48050000000002) [credentials with the role of a Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=122.80600000000001)[administrator that allows it to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=125.42200000000003) [administrator all Bigtable instances. Hit](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=127.72285714285712) [Ctrl+X to close this file. And now if you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=130.01833333333332) [run a cbt ls command or any cbt command](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=132.6390909090909) [for that matter, you'll find that the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=135.3036) [-creds warning has disappeared. This is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=138.3465) [how you would run commands against your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=140.89225) [Bigtable instance using a specific service account.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=5&mode=live&start=142.7672)

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We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=10.08771428571428) [start off in CloudShell terminal window.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=13.441285714285714) [I'm going to run a cbt read command on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=15.321) [customer\_offers table to see the records](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=17.82) [that are present in there. There are two](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=20.292) [records for the two customers that we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=22.334125) [added earlier. A cbt ls command on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=24.6465) [customer\_offers table will show us that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=27.62057142857143) [there are two column families within this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=29.236375000000002) [table. Let's now create a cloud storage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=31.592399999999994) [bucket. Cloud storage buckets are the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=34.84785714285712) [elastic data storage offered by the GCP.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=37.33257142857142) [The equivalent of Amazon is three buckets.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=40.36) [Gsutil is a command-line tool that comes](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=43.222) [pre-installed on your CloudShell VM. This](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=45.94)[is the tool that you'd use to get command](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=48.553444444444445) [line access to cloud storage buckets. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=51.149857142857144) [you're running gsutil standalone without](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=54.24666666666667) [having installed the gcloud SDK, then you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=56.505) [need to run gsutil config before you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=59.21775000000001) [work with cloud storage buckets. It's not](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=61.37442857142858) [needed here in the CloudShell. The gsutil](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=63.55328571428572)[mb command will create a new bucket called](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=66.40275) [spikey\_offers\_repository. The name of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=70.70866666666667) [bucket needs to be unique globally. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=73.27320000000002) [bucket has been created successfully.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=75.793) [Let's switch over to our web console and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=77.163) [use the Navigation menu to head over to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=79.276) [cloud storage buckets. Choose the Storage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=81.73) [option and this will show you all the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=85.03085714285713) [buckets that you have within this project.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=87.11199999999998) [We have just the one, the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=88.98) [spikey\_offers\_repository. 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We execute it using the Java command.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=131.87188888888886) [Java is preinstalled on CloudShell. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=134.46650000000002) [JAR file is a JAR file that we just](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=136.57833333333338) [downloaded and we want to perform an](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=139.15737499999997) [export. This is basically code written](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=141.11966666666666) [using Apache Beam APIs. Apache Beam is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=144.069) [basically a unified programming model for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=147.41)[bigdata processing. You can execute Apache](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=150.10559999999998) [Beam on a number of different back ends,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=152.25488888888887) [and the way you specify the backend is by](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=154.3687142857143) [using this -runner flag. 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The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=171.50125000000003) [destinationPath where the sequence file](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=174.074) [should be stored is within the cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=175.954) [storage bucket that we just defined. 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The more](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=206.59816666666669) [data that you have, say it's in petabytes,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=208.46633333333335) [you'll provision more workers to execute](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=210.67083333333332) [this job. 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If there are errors or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=250.2337142857143) [warnings in the export process, you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=252.96524999999997) [view the logs for this export. If you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=255.21657142857146) [click on the one in there, you can see](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=257.4692222222223) [there is something about machine type that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=259.46037499999994) [isn't sufficient for this kind of job. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=261.4593333333334) [don't really need to worry about this. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=264.13775) [can let our job run through to completion.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=266.35966666666667) [As our job completes processing, you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=269.421) [see that the number of workers is once](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=271.3705555555556) [again reduced to 0. We had asked for 20](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=273.3156) [workers, but this job was completed with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=276.19066666666663) [just 1. If you now switch back to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=278.69120000000004) [CloudShell, the logs on the terminal will](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=281.1617142857143) [show you that this job has run through to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=283.1453333333333) [completion. That's good, but has the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=286.6564285714287)[sequence file been generated. Let's head](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=288.4156666666666) [over to cloud storage and take a look.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=290.3956) [We'll go to Storage and here is our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=292.774) [spikey\_offers\_repository bucket. Within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=294.507) [this bucket, let's get into](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=297.08683333333335) [customer\_offers, that is the name of our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=298.336) [table, and within that, you'll find some](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=300.734) [binary files. We didn't really have that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=303.3816) [much data, we just have two files with the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=305.7771428571428) [information. Let's take a look at the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=308.83962499999984) [contents of one of these files, and for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=310.3243333333334) [this, we'll need to head back to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=312.19983333333323) [CloudShell. Run a gsutil cat command with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=314.40085714285703) [the full path to the file in order to view](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=316.7039999999999) [its contents. It's a binary file, which is why the contents look garbled degook.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=6&mode=live&start=319.4976666666665)

[Importing Data from a Sequence File](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live)

[If you have your data stored in an HBase](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=2.254) [cluster, either in an on-premise data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=4.323) [center or on some other cloud platform,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=6.995) [and you're planning a migration to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=9.222) [Bigtable, you'll need some way to move](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=10.932) [your records and that you'll do using](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=13.524624999999995) [sequence files. Data can be exported from](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=16.333250000000003) [HBase in the form of a sequence file and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=18.55544444444445) [you'll simply run a dataflow job to import](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=20.976333333333333) [the sequence file into your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=23.81728571428572) [instance. You'll first need to store the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=26.63825)[sequence file in a cloud storage bucket.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=28.691285714285716) [We already have a sequence file there. and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=30.716) [the records in that file is what we'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=33.291) [import into our new table within our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=35.419) [Bigtable instance. Run the cbt createtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=38.409666666666666) [command. In order to create a new table,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=41.1382) [we'll call this a spikey\_offers\_table.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=42.944) [This is a new table in the same](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=45.725) [spikey-offers-dev Bigtable instance,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=47.418) [though you can choose to create a new](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=50.167) [instance if you want to. Create the same](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=51.64) [two column families that existed in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=54.503428571428564) [original table. In this new table, we have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=56.56640000000001) [the offer\_family and we have the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=58.86674999999999) [customer\_family. So we have this new table](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=61.0666)[set up to match the original table. Once](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=63.029600000000016) [you have the column family set up, you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=66.16625) [choose your own garbage collection family.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=68.45400000000001) [You can set it based on maxversion or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=70.356) [maxage. I just go with maxage. You can set](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=73.41200000000003) [the customer\_family gc policy to be based](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=76.76342857142858) [on either max versions or maxage. Once](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=79.28333333333335) [again, I'll just choose maxage. Run a cbt](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=81.57733333333334) [ls command on this new table, the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=84.98266666666667) [spikey\_offers\_table, and here are the two](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=87.46483333333333) [column families along with the garbage](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=89.34014285714287) [collection policy that we just set up. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=91.447) [dataflow job to import data as a sequence](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=94.30575) [file is present in the same jar that we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=96.592875)[downloaded earlier. So if you don't have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=99.6525) [this jar in your CloudShell VM, you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=101.59577777777774) [download it once again using this curl](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=103.72885714285717) [command. Once this jar file has been](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=106.73679999999997) [successfully downloaded, let's kickstart](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=108.85914285714283) [our dataflow job. We kickstart this job](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=110.84700000000001) [using the Java command. The jar where our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=113.94100000000002) [executable lives is the jar that we just](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=116.48849999999999) [downloaded, and within that, we want to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=119.01719999999997) [run the import operation. The command-line](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=121.65699999999998) [parameters are very similar to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=124.1266)[command-line parameters that we specified](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=126.457) [for the export job. We want this job to be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=128.39033333333333) [executed on Cloud dataflow, which is where](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=131.77100000000004) [runner is equal to dataflow, our current](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=133.41349999999997) [project is the spikey\_bigtable project.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=135.26900000000003) [The bigtableInstanceId is the same, the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=138.538) [spikey-offers-dev instance, the table is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=141.37333333333333)[different though. We want to write out to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=144.10520000000002) [the spikey offers table. The sourcePattern](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=147.23960000000002) [command-line argument tells this dataflow](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=149.98900000000003) [job where the binary sequence files are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=152.25700000000003) [available in the spikey\_offers\_repository](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=154.85900000000004) [under the customer\_offers folder. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=156.71366666666665) [tempLocation is the staging location for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=160.9753333333333)[this dataflow job. We'll run with the max](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=163.1915) [of 9 workers in the us-east1-c zone. Hit](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=165.49800000000005) [Enter, and get this dataflow job running.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=168.2877142857143) [Meanwhile, we'll switch over to our web](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=171.733) [console and use the Navigation menu and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=173.852) [head over to dataflow. And here is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=175.926) [latest job that we kicked off, importing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=178.60022222222224) [our sequence style into our Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=180.927) [instance. And here is the execution graph](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=184.491) [for our dataflow job, it reads the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=186.76000000000002) [sequence file, applies a bunch of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=188.72785714285718)[mutations, and then writes out to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=191.04149999999996) [Bigtable. As usual, wait for the job to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=193.15283333333326) [run through. Once the job is complete, you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=195.60488888888887) [can switch over to your CloudShell](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=197.48075000000006) [terminal window and observe that the job](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=199.34899999999996) [is complete here as well. Now to see](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=202.0075555555555) [whether the data was indeed imported into](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=204.64524999999998) [our new table. Do a cbt count in our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=206.60619999999997) [spikey\_offers\_table and there you see it,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=210.36442857142862) [two records are now present. They weren't](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=212.3715) [present earlier. We can now run a simple](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=214.8795) [cbt read on this table to ensure that the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=217.36400000000006) [two records were added successfully. Here](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=219.76071428571422) [is our first record and here is our second](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=222.049125) [record, both of these look good. We've](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=224.90175) [successfully imported data into a new](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=227.62328571428571) [table in our Bigtable instance. We are now](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=229.917) [ready to clean up after ourselves. Use cbt](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=233.10466666666665) [deletetable to get rid of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=235.3865) [spikey\_offers\_table, as well as the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=236.792) [customer\_offers table. The cbt ls command](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=238.881) [will confirm that both tables no longer exist.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=7&mode=live&start=243.09650000000005)

[Creating Tables, Adding Rows to Bigtable Using Python](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live)

[In this demo, we'll see how we can access](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=2.413) [Bigtable programmatically using client](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=4.551) [libraries in Python. In order to write our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=6.845) [code, we'll use Cloud Datalab on the GCP.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=9.980666666666668) [Cloud Datalab is a VM instance on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=12.894444444444446) [Google Cloud which comes preinstalled with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=16.204714285714285) [a bunch of different tools that you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=18.106333333333335) [use to explore and visualize your data. It](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=20.522) [comes with a hosted Jupyter notebook which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=23.35242857142857) [can use to write code interactively. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=25.524428571428572) [cool thing about Cloud Datalab is the fact](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=28.789375) [that it comes with built-in integrations](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=30.965333333333334) [to other GCP services. So if you're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=33.3824) [writing code which connects a bunch of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=36.219428571428566) [different services together, Cloud Datalab](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=38.138999999999996) [is what you should be using. You can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=39.699999999999996) [create datalab VM instance using the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=42.66057142857143) [datalab create command from within your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=45.203399999999995) [CloudShell. The name of our VM will be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=47.757) [spikey\_bigtable\_datalab and I want it](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=49.513) [created in the us-central1-b zone. Datalab](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=52.463) [might take a couple of minutes to get up](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=55.836875) [and running. Google has to spin up a VM](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=57.68255555555556) [and install it with all of the things that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=59.605799999999995) [you need to work with data. As you're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=62.28557142857143) [waiting for datalab to spin up, you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=64.84175) [head over to your web console, and using](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=66.56025000000001) [the Navigation menu, go to Compute Engine](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=68.5718) [and VM instances, which will list out all](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=71.01971428571429) [of the virtual machines created in this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=73.26737499999999) [project. And there you see it, a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=75.6088) [spikey\_bigtable\_datalab. This is a virtual](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=78.2345) [machine. It has some interesting stuff in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=80.7596) [it though and that's what we'll see. 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If you're running pip install](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=136.964) [from within a datalab notebook, you need](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=138.929125) [to include the exclamation point at the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=140.82428571428574)[beginning. Hit Shift+Enter to execute the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=143.32940000000002) [code in this cell. 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Set up an import for the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=156.18300000000002) [Bigtable model, this contains the client](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=158.52074999999994) [that we'll use to connect to our Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=160.04200000000003) [instance. 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We'll continue to work with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=176.75614285714286) [the instance that we had created earlier](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=178.44199999999998)[are development instance,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=180.75471428571433) [spikey-offers-dev. Instantiate this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=182.966) [instance by calling client. instance. 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You can get a reference to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=242.331) [column family by calling table.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=244.95362500000002) [column\_family and then you call the create](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=246.8703333333333) [method on it. 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Here are the column names for the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=256.50733333333324) [product metadata column family,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=258.849375)[product\_id, name, variants, color, and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=261.02299999999997) [price. Here are two sets of values that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=264.03249999999997) [correspond to these columns. These are for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=266.183) [the first record that we're going to add](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=268.91675) [in and these values are for the second](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=270.85699999999997) [record that we are going to add to our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=273.1456666666667) [table. We are now ready to create a row in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=275.4098) [our product catalog table. The row key is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=278.44633333333337) [what you see here on screen. This is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=280.62979999999993) [same row key that we've used before.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=282.4556) [Create a row by calling table. row and by](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=284.039) [specifying this unique row key. Set the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=286.673) [values for the individual cells within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=289.93257142857146) [this row by calling row. set. cell,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=291.905375) [specify the column family, as well as the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=294.715) [names of the columns. Observe that when](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=297.429) [you write values to Bigtable, they're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=299.8185714285714) [encoded as a string in the utf-8 format.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=301.4262857142857) [Row. commit will actually create the row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=304.8814285714285) [in our Bigtable. Let's set up another over](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=308.4725) [here with the row\_key2 in exactly the same way. Call row. commit at the very end.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=8&mode=live&start=311.0522499999999)

[Reading Rows Using Python](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live)

[Once you have your Bigtable updated with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=2.727) [the records, you can read these records](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=5.1) [using the Python client libraries as well.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=6.916) [We want to access the record for the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=9.755) [customer who has the row key value](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=11.293) [starting with CG called table. read\_row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=13.4105) [and pass in the key. When you print out](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=16.701571428571427) [the row, you'll see that it's a Python](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=19.478999999999992) [object. You can extract individual fields](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=22.069571428571418) [from the row by calling row. cells and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=23.825285714285712) [then specifying square brackets which have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=26.682999999999996)[your column family and the name of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=29.41933333333333) [column. Product\_metadata here is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=32.84574999999999) [column family and we want to extract the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=34.832666666666654) [value from the product\_id column. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=37.00500000000002) [additional index 0 here indicates that we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=39.431) [want to access the latest version, the one](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=42.16599999999999) [with the latest timestamp. Print these](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=44.50699999999999)[out, and there you see it, the product\_id](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=46.23) [and the timestamp associated with this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=48.20433333333333) [value. Once you've seen the code to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=50.48675) [extract the value in one cell, the rest](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=52.72642857142857) [should be straightforward. Here, we get](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=55.049) [the product\_name for this particular row.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=57.05349999999999) [Here is the latest version in the product](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=59.874) [variants column under the product\_details](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=62.311) [family and here is the latest value in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=64.802) [color column in the product\_details](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=67.495) [family. And here is the value associated](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=69.67250000000003)[with the cell price. You can do the same](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=71.56000000000003) [thing for the second row present in your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=74.44911111111115) [table as well, the one which has the row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=76.46388888888892) [key prefix AA. Table. read row will give](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=79.55389999999996) [you a particular row and then you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=81.95012499999997) [access the cells within this row object to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=84.37074999999997) [extract information from a particular](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=87.20299999999997) [cell. All of this is exactly the same as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=89.451) [before. I don't need to go into the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=91.84811111111112) [details here. We can also confirm all of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=94.21622222222224) [this by switching over to our CloudShell](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=95.99475000000002)[terminal window and reading the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=97.92250000000003) [product\_catalog table using the cbt](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=100.16279999999999) [command. You can confirm here on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=102.86439999999997) [terminal window that the two records for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=104.829) [the two customers were added successfully.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=106.67899999999999) [We've done a bunch of operations on this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=110.117) [table programmatically and using the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=111.673) [command line. If you head over to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=113.98611111111111) [spikey-offers-dev page under Monitoring,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=115.755) [you should be able to see spikes in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=119.135) [graphs where we wrote out rows and read](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=120.821) [rows from our product\_catalog table.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=124.381) [Switch back to Cloud Datalab and delete](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=127.277) [this table by calling table. delete. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=129.284) [successfully deleted the product\_catalog](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=132.57583333333332) [table. Running cbt ls on the CloudShell](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=134.40316666666672) [terminal window will confirm this. And](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=137.3122857142858) [with this, we come to the very end of this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=139.954) [hands-on module where you used our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=142.106) [Bigtable instance. We connected to our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=144.323) [instance using the HBase shell, as well as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=146.54642857142852) [the cbt tool that GCP provides. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=149.21412499999997)[performed operations such as creating a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=152.16833333333335) [table, setting up column families,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=154.1885) [associating GC policies with our column](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=155.78483333333335) [families, adding records, deleting](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=159.21075) [records, and so on. We then saw how we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=161.345) [could run dataflow jobs against our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=164.22988888888887) [Bigtable instance in order to export data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=165.99528571428573) [from within our tables as sequence files](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=168.4087142857143) [and store them on cloud storage buckets.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=170.91233333333332) [We ran another dataflow job to import data](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=173.425) [from sequence files stored on cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=176.647)[storage buckets to populate a new table](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=178.77357142857142) [within our Bigtable instance. Using the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=181.30771428571433) [command line to work with Bigtable is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=183.89771428571427) [useful, but what is really useful is when](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=185.48714285714286) [you can use a high-level programming](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=187.55857142857144) [language. We use cloud datalab to write](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=189.87066666666666) [code to access our Bigtable tables](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=192.64999999999995)[programmatically using Python. In the next](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=195.377) [module, we'll study some of the other](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=198.95833333333337) [interesting features that Bigtable has to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=200.568) [offer. We'll see how we can perform](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=202.54555555555558) [multi-cluster routing using application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=204.553) [profiles, we'll see how automatic and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=206.912) [manual failovers work, and we'll also see](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=209.527) [how we can scale our Bigtable nodes programmatically.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=99972b78-a638-47e3-8886-fdd740db3573&clip=9&mode=live&start=211.969)

[Managing Cloud Bigtable Instances, Clusters, and Nodes](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live)

[Module Overview](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live)

[Hi, and welcome to this module where we'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=0) [see how we can manage our Cloud Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=4.292) [instances, clusters, and nodes. The first](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=6.536) [thing that we'll start off within this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=9.5906) [module is by studying application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=11.219999999999999) [profiles. We've already discussed](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=13.248999999999999) [application profiles earlier. This is what](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=14.65) [you'd use to enable multi-cluster routing.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=17.33157142857143) [When you have multiple clusters within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=19.945) [your same Bigtable instance, you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=21.44157142857142) [define application profiles that route](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=23.599333333333337) [your client request one cluster or the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=25.86166666666667) [other or to both. You'll also see how you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=28.703111111111113) [can handle manual failover using](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=31.628999999999994) [application profiles. When you have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=33.8285) [multiple clusters within your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=35.953) [instance and your application profile](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=37.416399999999996) [routes to both clusters, you'll find that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=39.545) [automatic failovers are taken care of for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=42.30250000000001)[you by Bigtable. If you have resources up](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=45.28685714285715) [and running on the GCP, you need to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=47.56222222222224) [monitor them. We'll see how to do that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=49.62666666666667) [using the Stackdriver monitoring tools.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=52.04924999999999) [We'll also see how we can use matplotlib](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=54.761) [to visualize Stackdriver monitoring](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=57.104111111111116) [metrics for your Bigtable instance. And](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=59.189499999999995) [finally, when you want to handle](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=61.86985714285714) [additional load, rather than manually](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=63.891) [scaling your Bigtable cluster, we'll see](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=65.809) [how we can do so programmatically using Python.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=0&mode=live&start=67.63357142857144)

[Replication and Application Profiles for Routing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live)

[In this demo, we'll study application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=2.445) [profiles and see how they can be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=4.267) [configured for multi-cluster routing. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=6.56125) [currently have just the single Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=9.886714285714286) [instance that is a development instance.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=11.577) [Development instances have just one node.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=14.022) [In addition, you can have replication](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=16.999) [enabled for development instances and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=18.757) [application profiles rarely make sense](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=20.473) [only when you do have replication enabled.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=22.95466666666666) [Let's create a new Bigtable instance in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=26.147) [this project using the Create Instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=28.248) [link on top. I'll call this a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=30.15) [spikey-offers-prod instance. The instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=31.885) [ID is also spikey-offers-prod. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=35.166000000000004)[instance type I leave as production.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=37.39342857142857) [Production instances require to have a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=40.102) [minimum of three nodes, the storage type](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=41.931) [for production instances, for better](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=44.742) [latency should be SSD and that's what I](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=46.85424999999999) [leave it as. Here is the first cluster of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=49.182) [my production instance, the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=51.62180000000001) [spikey-offers-prod-c1 cluster. I'm going](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=53.67166666666667) [to locate it in the us-central1 region and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=56.26049999999999) [the zone that I choose is us-central1-a. I](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=58.257999999999996) [leave it as three nodes for now. Our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=60.75333333333333) [production instance will have three nodes.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=64.00133333333332) [Click on Done and your first cluster has](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=65.856) [been set up. Take a look at what your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=68.216) [Bigtable instance costs now. It's roughly](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=70.88) [$1600 a month. We are going to make this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=73.83239999999999) [even more expensive by adding in a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=76.18799999999997) [replicated cluster. Click on Add](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=78.43571428571428) [replicated cluster and define your second](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=80.25028571428571)[cluster. The cluster id is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=82.66066666666666) [spikey-offers-prod-c2. The replicated](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=86.5398) [cluster will be in the us-central1 region,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=87.77185714285713) [but in a different zone. It has to be in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=89.55214285714285) [the different zone so that failover is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=92.6685) [possible. If a zone goes down, you don't](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=94.69766666666668) [want your entire instance to be down. I'm](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=96.7555555555556) [going to add an extra node to this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=99.2221111111111) [replicated cluster so that it has four](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=101.119) [nodes. The total cost for my Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=103.60574999999999) [instance is now almost $3, 700. Phew! That](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=105.83150000000002) [really shot up. So make sure when you're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=110.781) [creating these clusters for demo purposes,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=113.41914285714286) [you take them down as soon as possible.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=115.47114285714288) [Click on Done and here is our replicated](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=118.422)[cluster. We have one cluster with three](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=121.26377777777779) [nodes, another with four nodes. Click on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=122.98785714285714) [Create and let's set up this production](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=125.93699999999998) [Bigtable instance. You'll have to wait for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=128.234) [a little bit until it gets up and running.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=130.37366666666665) [You can click through to this instance and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=132.896) [take a look at the Overview and Monitoring](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=134.489) [page. The Overview page shows you the two](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=136.9556666666667) [clusters that you have set up. If you look](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=139.666) [on the left Navigation pane, you'll see a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=142.48337500000002) [link for Application profiles. When you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=144.6907142857143) [set up a Bigtable instance, it comes with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=146.65785714285715) [a default application profile, it's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=149.22599999999997) [automatically created for you. Application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=151.46766666666664) [profiles contain those settings which tell](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=154.08239999999998) [the table how to route incoming requests](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=156.95174999999998) [from clients. You can use the three-dot](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=159.773) [menu on the right in order to edit this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=162.38599999999994) [application profile if you want something](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=165.00985714285713) [different. Go to Edit application profile](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=166.87860000000003) [and this is what the page looks like. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=168.60062499999998) [main page here gives you a bunch of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=171.8407777777778) [information about the different kinds of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=173.119) [routing policies that you can configure.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=175.16) [You can configure single cluster routing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=177.836) [or multi-cluster routing. When your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=179.832) [application profile uses single cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=182.63333333333333) [routing, you can specify which of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=184.14914285714286) [production clusters should receive traffic](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=186.7914) [when an application connects using that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=189.2104) [profile. Single cluster routing is useful](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=191.53766666666667) [if you want to isolate certain kinds of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=194.18175000000002) [loads, such as CPU intensive loads. Or you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=196.71425000000002) [want read your writes consistency or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=199.5545) [single row transactions. These are the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=201.287) [advantages, the drawback is if your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=204.0434285714286) [cluster goes down, you have to failover](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=205.8776) [manually. Multi-cluster routing, on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=208.4884) [other hand, allows automatic failover.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=210.14399999999995) [Your traffic will automatically be routed](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=213.048) [to any cluster. If one is overloaded,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=214.978) [it'll be routed to the other. This is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=217.869) [high availability configuration. But the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=220.73000000000002) [only consistency guarantee is eventual](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=222.83339999999998) [consistency. Read your writes consistency](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=225.654) [and single row transactions are not](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=227.9097142857143) [supported here. And here are some tips for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=230.92719999999997) [how you would handle failover with single](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=233.22266666666667) [cluster routing. You have to manually](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=235.4686666666667) [update your application profile to point](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=237.44133333333338) [to a different cluster. In the case of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=239.54999999999995)[multi-cluster, your traffic will be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=242.38660000000002) [rerouted automatically to the cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=244.36233333333337) [that's still up. You can use the radio](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=246.52200000000005) [buttons here to decide whether you want](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=248.905875)[single cluster routing or multi-cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=250.73033333333336) [routing. With single cluster routing, you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=253.09625000000003) [can specify any of the individual](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=255.27212500000002) [clusters. In the case of multi-cluster,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=257.3668750000001)[you simply say any cluster and that's the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=258.696) [choice we've made. Let's keep this as-is.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=260.943) [Hit Save and head back to the main Application profiles page.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=1&mode=live&start=264.416)

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[Let's head back to our Cloud Datalab](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=2.673) [instance and create a new notebook. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=4.386) [write a program here which uses a specific](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=6.6743749999999995) [application profile to connect to our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=8.9732) [cluster. We'll call this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=11.638333333333332) [BasicCRUDforSpikeyCustomerDetails. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=12.711) [write our code using the Python3 kernel as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=16.244857142857143) [we did before. We'll also pip install all](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=18.6072) [of the libraries that we need, Google](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=21.288625) [Cloud Bigtable and Google Cloud code.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=23.647571428571435) [Import the Bigtable module and instantiate](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=26.229) [the Bigtable client to connect to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=28.982499999999995) [instances within the spikey-bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=31.729142857142858) [project. The instance\_id that we connect](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=33.799) [to is our production instance the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=35.97400000000002)[spikey-offers-prod. We'll create a new](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=39.169000000000004) [table within this instance and we'll call](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=41.08557142857142) [this table the spikey\_customer\_details](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=42.98185714285714) [table. We can confirm table creation by](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=45.384) [switching over to the web console. Go to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=48.749142857142864) [Instance details, go to the Monitoring](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=50.88885714285714) [tab, use the drop-down to switch over to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=52.93985714285714) [tables and you notice that we now have the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=55.968555555555554) [spikey\_customer\_details table available.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=59.621399999999994) [Switch back to Cloud Datalab. We are now](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=61.764) [ready to connect to this table, and this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=63.68633333333334) [time, we'll specify an application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=66.05925) [profile. This is the default application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=68.41487500000001) [profile that was created for us and which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=70.5235) [we examined earlier. This is the only](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=72.244) [configured profile that we have, we have](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=75.13342857142858) [no choice. Connect with the default](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=77.177) [profile and let's create a column family,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=79.21414285714283) [the customer\_info family. That was](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=81.99942857142858) [successful. Create a few columns within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=84.177) [this family, customerID, customerName,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=85.9137142857143) [gender, address\_City, address\_Country.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=87.91333333333334) [We'll create two customer records having](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=90.885) [values for these columns. We are now ready](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=93.144) [to create a new row with the unique row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=96.2264)[key and then set cell values for this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=98.74633333333333) [particular row and commit this row to our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=102.161) [table. Do the same thing for the second](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=104.6618888888889) [row for a second customer. Because we're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=107.31266666666667) [using the default application profile,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=109.96166666666667) [these requests to our Bigtable instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=111.60383333333334) [can be routed to any of our clusters. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=114.07222222222222) [same is true for all of our read requests.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=117.2455) [We can read individual rows, extract](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=119.581) [individual cell values from these rows.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=121.66642857142858) [All of this, we've seen before. After you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=124.105) [run a bunch of operations on this table](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=126.93766666666667) [either read or write operations call](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=128.86283333333333) [table. delete and delete this table.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=131.46614285714284) [Switch back to the web console to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=134.551)[Monitoring tab for your spikey-offers-prod](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=136.207) [instance and switch the drop-down to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=138.735) [reflect application profiles. And if you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=141.096) [take a look at the bottom, you'll find](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=143.07400000000004) [that all the reads and writes on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=144.923) [spikey-customer-details table, use the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=148.633) [default application profile. The default](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=150.9232) [application profile route a request to both clusters, c1, as well as c2.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=2&mode=live&start=153.41533333333336)

[Handling Manual Failover](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live)

[If you had an application profile](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=2.722) [configured with single cluster routing,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=4.099) [you'd have to manually handle your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=6.723) [failovers. Let's see how you do that.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=8.739857142857142)[Let's play around with our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=10.82) [spikey-offers-prod instance a little bit.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=11.876) [Click on Edit Instance and let's get rid](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=14.323) [of one of these clusters. I'll get rid of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=16.681222222222225) [the c1 cluster. This cluster is pending](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=19.326) [deletion, and once you hit save, your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=21.853599999999993) [Bigtable instance will be updated and this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=23.716428571428573) [cluster will be deleted. Let's play around](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=26.158) [with this a little more. Click through to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=27.990249999999996) [the spikey-offers-prod instance and let's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=30.649800000000003) [add another cluster and we'll call it the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=32.76171428571428) [c3 cluster. This cluster has to be in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=35.78066666666666) [same region as the original cluster, but](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=38.06477777777776) [has to be in a different zone. The zone](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=39.860333333333344) [that I'm going to select here is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=42.197749999999985) [us-central1-c zone. Click on Done here. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=46.46814285714285) [now have two clusters once again with this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=49.34274999999999) [Bigtable instance, cluster c2 and c3, both](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=51.744333333333344) [with 4 nodes. Click on Save and you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=55.026999999999994) [updated your Bigtable instance. I played](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=58.54711111111109) [around with this instance a little bit to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=60.575500000000005) [show you how easy it is to change your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=62.2578) [cluster configuration. Let's head over to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=65.03866666666666) [the Application profiles page using the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=67.87171428571426) [link on the left Navigation pane and this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=69.39249999999998) [time we'll create a new application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=71.4855) [profile to route to a single cluster. I](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=73.265875) [call this a spikey-reader-profile. Imagine](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=76.146) [that this is the application profile for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=78.44916666666667) [all of your read jobs. The radio buttons](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=80.5487142857143) [automatically have the latest clusters](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=83.8435) [that are available in your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=85.606) [instance. I'm going to route all my reads](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=87.98199999999999) [to cluster c3. With single cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=90.72950000000003) [routing, if you want atomicity at row](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=92.50400000000002) [level, you can click on the checkbox to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=94.69599999999998) [allow single row transactions. We'll leave](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=97.68671428571429) [that out for now. Hit Create and create a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=99.74833333333333) [new application profile. We now have two](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=102.86549999999997) [application profiles configured for our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=105.59833333333334) [spikey-offers-prod cluster. Switch back to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=108.13400000000001) [Cloud Datalab where we have connected to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=110.24062499999998) [our Bigtable using the default profile. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=112.85350000000001) [have deleted the spikey\_customer\_details](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=116.33525)[tables earlier. Go ahead and hit](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=117.66533333333334) [Shift+Enter on the cell and recreate that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=120.12499999999999) [table. Now instead of using the default](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=122.68074999999999) [profile, instead we'll use the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=125.43242857142857) [spikey-reader-profile which connects only](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=128.202) [to one of the clusters in our Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=129.50462499999998) [instance, the c3 cluster. Now let's go](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=132.04828571428573) [ahead and hit Shift+Enter on all of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=134.749625) [other cells in this Cloud Datalab](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=137.0202857142857) [notebook. This will execute those cells,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=139.03400000000002) [you'll write data to the table, and you'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=140.844) [read data from the table. Head back to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=143.46714285714285) [your web console where you have the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=146.085375) [spikey-offers-prod instance, and in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=148.6875) [Monitoring tab, switch to application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=150.7882) [profiles. And if you scroll down to the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=152.79649999999998) [bottom here, you'll see that the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=154.44600000000008) [spikey-reader-profile was used to access](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=157.40400000000005) [your table. Observe that the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=159.59933333333333) [spikey-data-profile always routes your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=161.64899999999997) [request to the c3 cluster. That's what we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=163.33785714285716) [have configured in the application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=166.239) [profile. Switch back to the overview page](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=167.95833333333331) [for this Bigtable instance and let's click](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=170.0265) [through to the spikey-offers-prod-c3](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=172.1683333333334) [cluster. What I'm going to try and do now](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=175.55874999999997) [is to delete this cluster and hit Save. So](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=178.07080000000008) [I'm going to update my Bigtable instance](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=181.273625) [and try and delete the c3 cluster, but](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=183.091) [when I try to hit the Save button, a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=185.61433333333335) [warning pops up. The warning tells me that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=187.94162500000002) [I have an application profile configured](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=191.06233333333333) [to route to c3. I need to update that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=193.7682) [first before I can delete this cluster.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=196.7983333333334) [Oops, maybe it's too early to delete this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=199.555) [cluster. I need to update my applications](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=201.8669999999999) [first. Let's undo this deletion and click](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=204.0777142857143) [on Save. Leave the cluster as-is. What we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=206.99599999999995) [really need to do is to go to all of our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=210.40563636363635) [applications accessing Bigtable, update](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=212.9494) [the profiles to be one that's going to be](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=214.813625) [around that'll access multiple clusters or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=217.57333333333332)[another cluster. Once we've done that, we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=219.907) [can go delete the application profile and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=221.98388888888883) [then update our Bigtable instance to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=224.24850000000004) [delete the cluster that we wanted to get rid of in the first place.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=3&mode=live&start=226.7875)

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Here, we take a look at how we can use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=9.5988) [Stackdriver to monitor our Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=12.1935) [instance. Let's start off in our web](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=14.424333333333335) [console. Use the Navigation menu and head](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=16.253714285714288) [over to the Stackdriver category and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=18.653750000000002) [choose Monitoring. This will ask you to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=21.671333333333337) [create a new workspace or you can add your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=24.03177777777778) [current project to an existing workspace.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=26.115375000000004) [I'll just go with creating a new workspace](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=27.984) [for now. Click on Continue, click on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=29.686500000000002) [Create workspace and choose only the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=32.73357142857142) [spikey-Bigtable project to be part of this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=34.87471428571429) [current workspace. Stackdriver monitoring](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=37.49366666666667) [is not limited to the GCP. You can use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=39.575399999999995) [Stackdriver to monitor resources on AWS as](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=42.28724999999999) [well. Let's just skip AWS setup for now.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=44.684333333333335) [We are focused on Bigtable for the GCP. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=47.778) [can click Continue on this page as well.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=50.702888888888886) [this talks about the monitoring agent that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=52.254) [you can install on VM instances, which](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=54.212) [gives you additional metrics. This is not](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=56.8074) [relevant for us when we are working with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=59.12499999999999) [Bigtable. We can move on. I don't want any](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=60.91433333333334) [Stackdriver reports. Click on Continue,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=63.45633333333333) [wait for a little bit, and then click](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=65.086875) [Launch monitoring. And this is our main](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=67.98360000000001) [Stackdriver monitoring page. You can use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=70.40287500000001) [this page, monitor the up time of your VM](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=71.90300000000002) [instances, set alerting policies, create a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=74.04525000000001) [dashboard, and so on, and so forth. All](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=76.53233333333331) [your monitoring requirements fulfill in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=79.0098) [one place. What you're going to do first](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=81.254125) [is to create a new dashboard. Click on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=83.01814285714286) [Dashboard's link and go to Create](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=85.17557142857144) [Dashboard. Give this dashboard a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=87.091) [meaningful name. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=88.92766666666667)[spikey\_customer\_offers\_dashboard is our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=90.2428) [name. A dashboard is essentially a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=92.17720000000001) [collection of charts containing important](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=94.28057142857146) [metrics that you might want to monitor.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=95.8978) [Click on Add chart. We'll now add a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=97.667) [visualization to find the CPU load of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=100.345) [busiest node in our Bigtable instance. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=102.929) [resource type that we want to monitor is a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=106.01174999999999) [Cloud Bigtable cluster and after we've](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=108.5365) [chosen the resource type, you'll be able](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=111.223) [to get a list of metrics that you can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=113.040375) [monitor for this resource type. You can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=115.35866666666668) [choose that metric that you're the most](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=117.64275) [interested in. Here, it's the CPU load of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=119.637) [the hottest node, and right away, you see](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=121.93) [a visualization off to the right of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=124.66950000000001) [screen. Stackdriver gives you many options](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=126.88757142857143) [to configure your chart. You can filter](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=129.1124) [out what you're not interested in seeing.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=131.5432857142857) [You can group by a particular property,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=133.303) [you can perform aggregations, reductions,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=135.928) [and so on on your data. 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If you observe the chart](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=152.07600000000002) [carefully, there are three different](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=154.11766666666668) [colors representing the three Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=155.651) [instances that we've created in all of our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=158.226) [demos so far. Another thing that you might](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=160.935) [want to monitor is the CPU load of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=162.956)[cluster as a whole. Let's add a new chart](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=164.993) [for this. The resource type is once again](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=167.579125) [your Bigtable cluster and the metric that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=170.13442857142857) [we're going to choose here is the CPU](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=173.1105) [load. 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Stackdriver offers a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=187.23833333333334) [variety of options to configure your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=189.71899999999997) [chart. You can change the mode of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=192.05166666666665) [chart to give you some statistical](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=194.00288888888898) [information. 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Let's go ahead and add a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=216.07033333333337) [third chart. A third important metric for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=219.00075000000007) [Bigtable is the number of nodes in a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=221.48771428571422) [cluster, especially if you're rescaling](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=223.81828571428568) [programmatically. Choose Cloud Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=226.48860000000002) [cluster and let's monitor the number of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=228.05550000000002) [nodes. Our chart isn't really that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=231.20999999999998) [interesting because we haven't resized our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=233.0728333333334) [clusters. Add this chart, you now have a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=4&mode=live&start=235.6318333333334) [dashboard with three charts. 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I'm going to rename](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=15.538428571428573) [this notebook to be the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=17.674999999999997)[spikey-visualize-notebook, but I'm going](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=19.93) [to try out some matplotlib visualizations.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=21.724) [I'll switch the kernel over to python3. To](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=23.366) [access Stackdriver monitoring metrics, you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=27.148799999999998) [need to import the monitoring module from](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=29.366285714285713) [google. cloud and instantiate a monitoring](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=31.72383333333333) [client, which you can do by calling](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=34.34028571428571)[monitoring. Client. If this library is not](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=36.86333333333334) [available, you can get it using a simple](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=39.94700000000001) [pip install as you see here on screen. The](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=42.191111111111105) [remaining packages are for matplotlib,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=45.382333333333335) [datetime, other utility packages that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=47.384) [we'll need. Stackdriver metrics are time](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=49.87900000000001) [series data. When you need to access](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=52.55700000000001) [metrics, you need to specify an end time](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=54.629499999999986) [when you perform your query. Here are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=56.82666666666666) [three queries that we make to different](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=59.304714285714276) [URLs. We want to access the metrics of our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=62.66550000000001)[Bigtable instance over a period of 12](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=64.79) [hours. Every metric is associated with a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=67.71687500000003) [type. This type is bigtable. gooleapis.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=70.11328571428574) [com/cluster/node\_count. This gives us the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=74.02633333333334) [node count for our Bigtable clusters. We](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=76.4652857142857) [just visualized this using Stackdriver in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=79.25666666666666) [the previous clip. Here is the metric that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=81.6545) [gives us the CPU load for our clusters and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=84.40688888888886) [here is the metric that allows us to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=86.96250000000002) [access the bytes used on disk. We can use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=89.56400000000002) [the align method on each query in order to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=92.6293333333333) [bucket and aggregate our metrics. We'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=95.50300000000001) [divide these metrics into 10-minute](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=98.17466666666667) [buckets and perform the mean aggregation](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=100.358) [or the average aggregation. We can now](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=102.45457142857146) [access this aggregated data as a Pandas](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=105.40962499999999) [data frame. Simply call query.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=107.5805) [as\_dataframe and we get the result in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=109.80328571428572) [Pandas. Here is the data frame showing us](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=113.19250000000002) [node counts over the past 12 hours. Take a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=115.48549999999999) [look at the column for the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=119.36399999999999) [spikey-offers-prod-c1 cluster that we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=120.645)[deleted some time ago. Initially, we had a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=123.237) [node count and the rest of the records are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=125.90644444444445) [just NaNs. That's because the cluster was](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=128.86999999999998) [deleted. We can access the CPU data in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=132.08400000000006) [form of a data frame as well and we get](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=134.64609090909087) [this information for every cluster in our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=137.1085) [line instances, including the cluster that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=140.16214285714278)[used to exist in our spikey-offers-prod](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=142.94683333333333) [instance, but no longer does. And here are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=145.994) [the bytes used in this data in the form of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=149.4843) [a data frame. Notice that all of the disks](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=152.32599999999996) [are SSD disks because that was the choice](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=154.88600000000008) [we made. Once we have all of the data in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=157.16771428571425) [the form of data frames, plotting then](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=159.11181818181822)[using matplotlib is very straightforward.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=161.3153333333333) [Simply pass the data frame in, give it a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=163.536) [subtitle, and here we have it, the CPU](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=165.707) [usage over time. You can ignore the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=168.4348) [warnings that you see here. This is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=170.67222222222222) [because the matplotlib default font](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=172.55442857142856) [doesn't really work out of the box with](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=174.603) [Cloud Datalab. Let's visualize the node](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=176.7575) [count here using matplotlib. Pass in the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=179.8426) [data frame for the node count and here is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=181.97733333333338) [the result. Our production instance has](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=184.5844) [two clusters, both with four nodes, and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=186.58400000000006) [our development instance have single](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=188.88742857142861) [cluster with one node. And here is the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=190.8692857142857) [matplotlib visualization for bytes used on disk.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=5&mode=live&start=194.115)

[Programmatically Scaling Clusters](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live)

[If you're working with Bigtable in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=2.243) [production and you're handling huge](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=3.63) [variations in traffic, as SpikeySales](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=5.386) [engineers do, you might want to know how](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=7.860142857142857) [to programmatically scale your Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=11.0255) [cluster nodes. That's what we'll see in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=12.653500000000001) [this demo. Create a new notebook and give](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=14.876857142857139) [it a meaningful name. I'm going to call it](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=16.955999999999996) [the SpikeyMetricScaler. Once again, let's](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=19.666) [switch over our kernel to Python3 and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=22.294624999999996) [write our code in Python3. The first thing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=24.453285714285716)[we need to do is pip install Google Cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=27.153333333333336) [Bigtable and Google Cloud monitoring.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=29.4886) [Import the Bigtable monitoring v3 modules](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=32.695) [from Google. cloud, and from within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=36.111) [monitoring v3, import the query module.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=38.151) [Our current project is a spikey-bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=41.439) [project. Instantiate a Bigtable client to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=43.622142857142855) [connect to instances within this project](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=45.889571428571415) [and the instance to which we want to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=47.657666666666664) [connect is the spikey-offers-prod. This](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=49.99833333333335) [production instance has a replicated](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=53.73471428571428)[cluster. The 2 clusters are with the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=55.998285714285714) [suffix c2 and c3. We want to specifically](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=59.20980000000001) [monitor the cluster with the suffix c2 and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=62.404999999999994) [scale programmatically if needed. Next up,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=65.03557142857144) [we specify CPU thresholds for scaling up](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=68.55071428571429) [and down. A high threshold is 0. 6 and a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=71.079) [low threshold is 0. 5. Short sleep and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=74.01000000000002) [long sleep are sleep timing specified in](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=77.49899999999998) [milliseconds. You'll see in just a bit how](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=80.52199999999998) [they're used. We'll first need to access](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=83.1308888888889) [Stackdriver monitoring metrics for our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=85.599) [Bigtable instance in order to get the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=87.25120000000003) [current CPU load for our cluster.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=89.29699999999997) [Instantiate the monitoring metric service](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=91.688) [client and construct a query to access the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=93.848) [CPU load for our cluster. The metrics are](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=97.151) [available in the form of a time series](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=100.12533333333336) [object, convert it to a list and extract](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=101.86300000000001) [the latest value for CPU load.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=104.5935) [Scale\_bigtable is the method that we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=107.682) [perform the actually scaling. The minimum](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=109.519) [number of nodes that we have will be 3,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=111.51950000000001) [the maximum number of nodes that we might](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=113.997) [want is 30, and we'll change the number of](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=116.56344444444444) [nodes up or down in steps of 1. Call](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=119.6134) [instance. reload to get the latest](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=122.79285714285714) [information and access the cluster that we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=124.82) [are interested in, the cluster with suffix](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=127.635) [c2. Cluster. serve\_nodes will give us the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=130.34574999999998) [current node count. Scale\_up true or false](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=133.053) [is an input argument to this function. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=136.358) [you're planning to scale up, check whether](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=138.58216666666667) [the current node count is less than the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=140.81171428571426) [max node count, and yes indeed, if it is,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=143.12550000000002) [get a new count of nodes by incrementing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=145.92719999999994) [the current node count by one. We can go](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=148.48485714285715) [about the maximum here so make sure you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=151.3573333333333) [keep under the max node count. Set the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=153.66312500000004) [serve\_nodes of the cluster to this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=156.16074999999995) [new\_node\_count and call cluster. update.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=158.812) [If the input argument says to scale down](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=160.772) [the nodes, check whether the current node](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=163.163) [count is greater than the minimum node](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=165.622) [count. If yes, indeed it is, then we can](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=168.42200000000005) [scale down by our step size of 1. Make](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=171.10733333333326) [sure the node count stays about the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=174.328) [minimum value. Set the serve\_nodes of the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=176.24657142857143)[cluster to the new\_node\_count and call](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=178.8881111111111) [cluster. update. Now we can define a main](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=181.39677777777771) [function where we first access the cluster](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=183.8083333333334) [CPU load. We'll then check the CPU load if](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=186.89266666666663) [it's greater than the high threshold. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=190.08237500000007) [yes, indeed it is, then we'll scale our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=192.631125) [Bigtable upwards. Scale up is set to true,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=195.83466666666666) [we'll add more nodes. If the cluster\_cpu](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=198.63600000000002) [is below the low CPU threshold, we'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=200.577125) [scale down our bigtable\_cluster. In all](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=203.6136666666667) [cases, we'll sleep for a little bit before](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=207.1681111111111)[we return so that we don't return](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=209.59344444444446) [instantly. We'll wait for the scale up or](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=211.74555555555565) [scale down to happen. Call the main](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=213.14149999999992) [function and you'll find that immediately](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=215.17875) [our cluster will scale down to three](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=217.47) [nodes. We weren't really using our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=220.35616666666664) [cluster, it wasn't really loaded. Our CPU](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=222.13283333333334) [utilization was below the low threshold.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=224.99475) [Let's switch back to our web console and](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=227.727) [head over to the Monitoring tab for the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=229.977) [spikey-offers-prod instance and select the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=232.076)[instance in the drop-down. Here, you'll](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=235.037) [see that our initial node count was 4. If](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=237.21428571428572) [you wait for a little bit, you'll find](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=239.79060000000004) [that it falls to 3. The graph takes a](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=241.98371428571426)[minute or so to update. If you click on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=245.4214444444444) [the Overview tab and take a look at your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=247.98233333333334) [clusters, you'll find that c2 now has just 3 nodes.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=6&mode=live&start=250.26300000000003)

[Summary and Further Study](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live)

[And this brings us to the very end of this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=2.429) [module where we worked with our Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=4.298) [instance, clusters, and nodes. We started](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=6.264) [off by creating and managing application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=9.745999999999999) [profiles for multi-cluster routing. We saw](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=11.877400000000002) [how you could use application profiles to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=14.963857142857144) [split your workloads so that all of your](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=16.828285714285716)[requests are routed to a single cluster.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=19.502800000000004) [If you have single cluster routing though,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=21.88) [you have to perform failover manually.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=24.323) [Automatic failovers are only available for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=26.993) [clusters which have multi-cluster routing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=29.641) [enabled. After working with application](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=32.35933333333334) [profiles, we moved onto Stackdriver](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=34.56559999999999) [monitoring. We saw how we could use](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=36.5104) [Stackdriver to monitor the health of our](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=38.837499999999984) [Bigtable instance. We did this not just](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=41.45771428571429) [using Stackdriver visualization, but also](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=43.90657142857142)[use matplotlib. We programmatically](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=46.5632) [accessed Stackdriver metrics from within](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=49.008500000000005) [our Python program and used matplotlib to](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=51.38971428571428) [plot these visualizations. And finally, we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=54.985499999999995) [saw an interesting demo of how we could](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=57.73762500000001) [programmatically scale our Bigtable](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=60.369) [cluster nodes, up or down based on the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=62.087714285714284) [current CPU load. And on this note, we](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=66.07639999999999) [come to the very end of this course on](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=68.78099999999999) [Cloud Bigtable. Now before you leave,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=70.99360000000001) [there is something I have to warn you](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=72.93071428571426) [about. You know that Bigtable is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=74.73899999999999) [expensive. Make sure that you delete all](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=76.564) [of the resources that you used in this](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=78.29124999999998) [course. Delete your Bigtable development](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=80.48514285714289) [and production instances, delete the](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=82.08579999999998) [Datalab VM instance, delete any cloud](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=84.31000000000002) [storage buckets that we created, and make](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=87.046) [sure you delete the service account that](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=89.32062500000004) [we used to access Bigtable. If you're](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=91.77166666666665) [interested in the Google Cloud Platform](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=94.19885714285714) [and want to learn more about other GCP](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=95.512) [services, Architecting Data Warehousing](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=98.3918) [Solutions Using Google BigQuery is a good](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=101.063) [course for you to watch. BigQuery is](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=103.611) [Google's serverless data warehouse for](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=106.56320000000001) [analytical processing. If studying](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=109.55799999999999) [Bigtable has got you interested in HBase,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=111.6147142857143) [here is a course on Pluralsight for you,](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=113.79724999999999)[Getting Started with HBase: The Hadoop](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=116.356) [Database. It's time for me to say goodbye](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=119.40466666666667) [now. That's it from me here today. Thank you for listening.](https://app.pluralsight.com/player?course=google-bigtable-architecting-big-data-solutions&author=janani-ravi&name=8cfa8bd0-e424-43a1-bf8d-2e0fd9455416&clip=7&mode=live&start=121.93574999999998)