



AN INFLUXDATA CASE STUDY

Texas Instruments Boosts Manufacturing Visibility in a Bid for 24/7 Productivity

InfluxDB Turns 1.5 Million Data Points Per Day into an Observability Dashboard the Whole Company Can Use



Company in brief

Texas Instruments is a storied 70-year-old company that designs, manufactures, tests, packages, and sells semiconductors throughout the world. Its factories operate 24 hours a day, 365 days a year, employing 30,000 people in the US, Germany, Japan, and China.

Case overview

The company wants to gain visibility to its entire manufacturing operation to understand inefficiencies and their causes, measuring equipment utilization, failures, repair time, and more. It needed a robust time series platform to analyze the 1.5 million data points flowing out of its industrial sensors per day and to work toward automated alerts and workflows to prevent calamities on the factory floor.

The business challenge

The scale of the distributed manufacturing operation and its complexity creates the first observability issue. Imagine 1,000 different types of machines running multiple software packages, producing increasingly complex “wafer” semiconductor parts in the middle of the night in a far-flung factory. Then, there’s physical and human variability as well — different building layouts, staff working arrangements, and shift patterns create different outcomes on the floor. With the expectation of 100 percent production, any downtime costs the company significantly — in unusable product, missed deadlines, and lost business.

Understanding inefficiencies is also an important step to project what might go wrong next. For example, a diffusion furnace might be misbehaving for weeks before it fails completely, torching 50-100,000 wafers in a few minutes. The company’s goal is to automate its operations to the point where if there’s a problem, it can shut itself down.

Technologies used:

Chronograf, Grafana, InfluxDB, Linux VM, Python client library, RDBMS.

| The technical challenge

On the data side, there is a lot to process. Sensor data is streaming in at different rates, in various formats, from machines operating slightly differently from factory to factory. That is appended to other data, like working team information, to determine the overall health of not just individual machines but entire operations. Texas Instruments' leadership needed high-level indicators to determine the robustness of their operation and find places they can tighten up, as well as troubleshoot tool anomalies and failures more effectively.

Previous attempts to understand manufacturing productivity involved automated longitudinal reports, which gave the company an idea of how their tools performed over time. However, they could not be manipulated into different dashboards for different company needs, and because it was a static report rather than an app built on streaming data, it did not allow for prediction or forecasting.

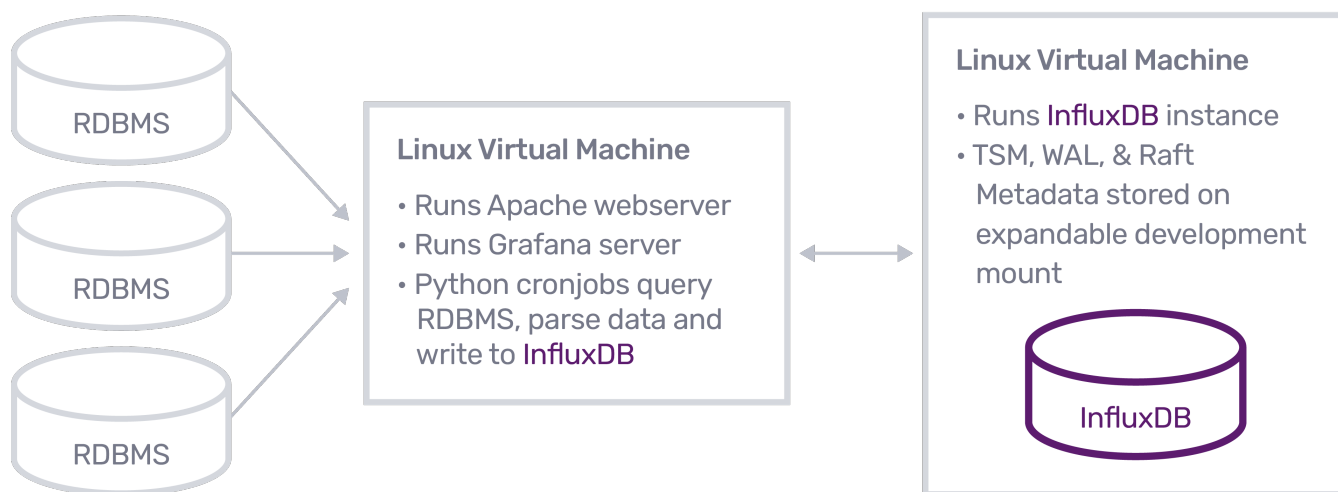
So Probe Engineering and Manufacturing Supervisor Michael Hinkle spun up an instance of InfluxDB and started streaming data from the testing equipment.

The solution

Michael says he was surprised at how quickly he was able to get data in the InfluxDB platform and produce dashboards for other parts of the business. He used Grafana to show insights including tool use by minute, mean, and goal, tool performance anomalies and downtime, as well as metrics like time-to-repair in different locations.

Despite not being a developer – Michael has an electrical engineering background – he says he was able to use the InfluxData Python client library and some InfluxQL to produce results in just a few minutes.

Texas Instruments Loading Scheme



He set up email alerts for real-time problems and produced reports that could show rates of change in equipment use, which is often the first sign of big trouble. For example, if machines in a particular building are all slowing down, it could be the result of a normal occurrence like a shift change or it could be an early sign of a power drain. One is an everyday lull, the other a potential disaster. Only through the analysis of detailed streaming data can you tell the difference and alert the right people and systems in time.

“

Using software like InfluxDB, I can prototype more, I can experiment more ... If I'm not 100 percent sure I know what I'm doing but I know the direction I'm going in, I can prototype and play around with it. I don't have to move a mountain to change anything.”

Michael Hinkle, Probe Engineering And Manufacturing Supervisor, Texas Instruments

Results

Texas Instruments uses the InfluxDB platform to catch any dips in performance across its production and testing lines. Company leaders of all stripes have access to relevant dashboards to show the state distribution of equipment and have the ability to drill down to the information they need to make decisions. For example, which testers are idle, in production, and down? Which teams are responding to incidents slower than others? And how is an individual piece of equipment performing compared to its goal?

What's next

Michael wants to start using smarter techniques to analyze the data, including decomposition based on a 14-day shift rotation. He plans to build better dashboard apps to improve the UI for internal stakeholders, and summary dashboards to reduce the complexity of reporting. He says he's excited to tap into the abilities of InfluxDB for prediction, likely using AutoRegressive Integrated Moving Average (ARIMA) or Holt-Winters forecasting.

About InfluxData

InfluxData is the creator of InfluxDB, the leading time series platform. We empower developers and organizations, such as Cisco, IBM, Lego, Siemens, and Tesla, to build transformative IoT, analytics and monitoring applications. Our technology is purpose-built to handle the massive volumes of time-stamped data produced by sensors, applications and computer infrastructure. Easy to start and scale, InfluxDB gives developers time to focus on the features and functionalities that give their apps a competitive edge. InfluxData is headquartered in San Francisco, with a workforce distributed throughout the U.S. and across Europe. For more information, visit influxdata.com and follow us [@InfluxDB](https://twitter.com/InfluxDB).



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