



#### CLIENT

[Semios](#)

#### INDUSTRY

Data analytics for produce growers

#### TECHNOLOGIES

Google Cloud (GC), TensorFlow, Cloud Functions, Cloud Machine Learning Engine, Google Earth Engine.

#### BUSINESS NEED

[Semios](#) provides precision agriculture technology to help tree fruit and nut farmers worry less about their crops. But its original, on-premise data center struggled to scale. The company needed a robust cloud solution that could scale easily and combine data from several different sources.

#### SOLUTION

Pythian experts helped Semios migrate their on-premise data ingest, storage, and processing to GC, combining IoT sensor data with other information from Google Earth Engine and implementing machine learning models through TensorFlow.

#### RESULTS

Semios is now much better able to help growers be more efficient through real-time data that are more accurate and granular than ever before, delivered on an intuitive dashboard providing real-time metrics to inform decision-making.

## PYTHIAN HELPS SEMIOS SCALE ITS DATA ANALYTICS FOR PRODUCE GROWERS THROUGH A GOOGLE CLOUD MIGRATION

#### BUSINESS NEED

[Semios](#) provides precision agriculture technology to help tree fruit and nut farmers worry less about their crops. Its real-time platform uses networked sensors to track and optimize responses to plant health, pests, and possible crop disease. It's a valuable tool in the fight to improve crop yields—something that traditionally has been tackled by farmers themselves through age-old best practices and eyeballing crops—while reducing the amount of freshwater and pesticides required during growing seasons.

Semios' original, on-premise data center wasn't very flexible, however, and as new clients and more data was brought on board, it struggled to scale up. The company needed a robust cloud solution that could scale easily, with more reliable sensor data capture and data integration tools in order to seamlessly and quickly combine sensor data with several other vital data points like satellite imagery and geospatial datasets. It also needed machine learning tools to help predict when problems might arise. And it all needed to be delivered, in real-time, to mobile devices so farmers could identify and act on issues in the field, as they happen.

#### SOLUTION

Semios engaged Pythian experts to help migrate its on-premise data ingest, storage, and processing to Google Cloud (GC). The company now combines machine learning, in-crop wireless networks and half a million IoT sensors across 80,000 acres of orchards to offer real-time big data monitoring that helps farmers predict, identify and prevent issues before they become massive problems. These sensors collect more than 200 million data points each day on variables like moisture, network strength, pheromone dispenser performance, weather (including temperature and wind conditions), and insect activity via

networked cameras within insect traps that photograph the trapped insects multiple times daily.

It then uses BigQuery to determine how well all those sensors are performing out in the field, while also incorporating third-party information related to pesticide and fertilizer use. Google's open-source TensorFlow platform, combined with Google Cloud Functions and Cloud Machine Learning Engine, was used to train specialized machine learning models to figure out the volume and type of insects within each trap to meet the client's machine learning requirement for insect monitoring. Finally, Google Earth Engine was tapped to combine satellite imagery with geospatial datasets and analytics.

## RESULT

Semios now processes more than 166 million data points every day and is now better able to help growers become more efficient through real-time data that are more accurate and granular than ever before. Their new machine learning models and camera traps helped clients reduce moth populations by around 1.5 billion during the first year it was implemented, resulting in improved safety and food quality. Semios now helps farmers identify potential pest threats in real time. That means less pesticide use because growers know the best times to spray (or even if a non-toxic solution might work just as well), which in turn results in lower operating costs, less contamination of the environment, and fewer catastrophic pest incidents that often result in economic hardship—or worse—for growers.

Semios also now combines sensor information with aerial data from Google Earth Engine—which easily fits into GC's data flow—which has helped grower clients optimize decision-making around irrigation and other actions that previously were decided based on best practices or gut feeling. Thanks to Pythian expertise and the power of GC, Semios now offers an intuitive dashboard providing real-time metrics to inform decision-making around conditions and what actions to take to improve product quality.

### ABOUT PYTHIAN

Founded in 1997, Pythian is a global IT services company that helps organizations transform how they compete and win by helping them turn data into valuable insights, predictions and products. From cloud automation to machine learning, Pythian designs, implements and supports customized solutions to the toughest data challenges.

### WORLDWIDE OFFICES

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