

# IHME Provides COVID-19 Pandemic Global Population Modeling Leveraging Qumulo

The Institute for Health Metrics and Evaluation (IHME) provides the rigorous and comparable measurement of the world's most pressing health problems and evaluates the strategies used to address them. But, what happens when a global pandemic suddenly increases the stakes and urgency?

## Business Results

IHME delivered COVID-19 visualizations within days of initial requests and rapidly scaled to meet needs from governments and healthcare officials tasked with keeping communities safe around the globe.

Since the COVID-19 pandemic hit, IHME's Qumulo systems helped to analyze up to 20x more data every day

Qumulo made it possible to ingest, process and leverage data coming in from a wide range of internal and external sources

IHME is an independent global health research organization based at the University of Washington School of Medicine. IHME's mission is to improve the health of the world's populations by providing the best public health information available. IHME makes their research freely available so that policymakers and healthcare institutions have the evidence they need to make informed decisions on allocating healthcare resources -- critical decisions that save lives.

## IHME Serves Global Health

IHME was an early adopter of Qumulo, initially deploying Qumulo file storage in 2015. Qumulo provided IHME with the dynamically scalable architecture and real-time visibility it needed to manage a wide variety of incoming data from hospitals, universities, and governments around the world. In 2017, Qumulo published a case study with IHME detailing how "Qumulo Helps Researchers Combat Global Disease." The study discussed IHME's extreme capacity and performance requirements, and how

Qumulo systems exceeded these demands with its easy to use, scalable architecture, and clear visibility into data. IHME was able to ingest incoming raw data rapidly to create population graph visualizations. These offerings helped non-medical personnel easily visualize data results, so that they could take decisive action.

**"Visualizations are core to IHME communications with policymakers for the scientific papers that are rigorously peer-reviewed by journals. Qumulo is critical to enabling us to distill hundreds of millions of data points into a single visualization, which allows policymakers to easily view the results and communicate them to their teams."**

— Serkan Yalcin,  
Director of IT Infrastructure, IHME

## Then the World Changed

Late in 2019, a serious illness was on the move in Wuhan, China. By early 2020, COVID-19 crossed international borders



## Powering Complex Data Analytics

Qumulo's API integration with IHME custom applications and real-time data visibility, coupled with high performance for intensive analytic workloads enable IHME to rapidly distill large amounts of complicated information into a suite of interactive data visualizations.

- Global Burden of Disease**  
 IHME's flagship publication first appeared in 2010 and has been published every year since then. Collected and analyzed by a consortium of more than 3,600 researchers in more than 145 countries, the data capture premature death and disability from more than 350 diseases and injuries in 195 countries, by age and sex, from 1990 to the present, allowing comparisons over time, across age groups, and among populations.
- Future Health Scenarios**  
 IHME is adding 20-year forecasting to GBD. Working with 2020 numbers, IHME will forecast what 2040 might look like under a variety of different frameworks and scenarios. Forecasts include projected population rates, what each country's biggest burdens are going forward, and where governments should invest now for the best future impact.
- Local Burden of Disease**  
 IHME is mapping major disease activity in tiny geographical areas of 5x5 kilometer tiles. For example, malaria is a serious health problem in large parts of Africa. By mapping small geo-locations for malaria occurrences, IHME enables public health agencies to customize their responses to distinct areas and populations.

and was well on its way to creating a global pandemic.

Though the World Health Organization (WHO) did not announce a pandemic until March 11, some hospitals were not waiting on WHO.



In February, the University of Washington School of Medicine requested IHME's immediate help with pandemic modeling. Other hospital systems and multiple state governments quickly followed with requests for population models for their communities from IHME. They needed to know when COVID-19 would overwhelm their ability to care for patients, and what they could do to avoid that. Within days, similar requests poured in from Puerto Rico, Canada, and European Economic Area (EEA) countries.

In order to respond to their urgent requests,

IHME needed to produce large-scale data modeling for forecasts, and to include daily and cumulative COVID-19 death reports, infections and testing numbers, and social distancing information.

Almost overnight, IHME needed massive additional data resources. IHME turned to Qumulo to help them respond to the new influx of data and create a rapid release cadence of new visualizations while not putting existing projects on hold. By coupling two powerful technologies, Qumulo for data processing on-prem and Microsoft Azure for hosting data visualizations, IHME was able to respond in just 48 hours to the onslaught of COVID-19 projections that have been leveraged by governments, health organizations, and individuals around the globe.

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onslaught of COVID-19 projections that have been leveraged by governments, health organizations, and individuals around the globe.

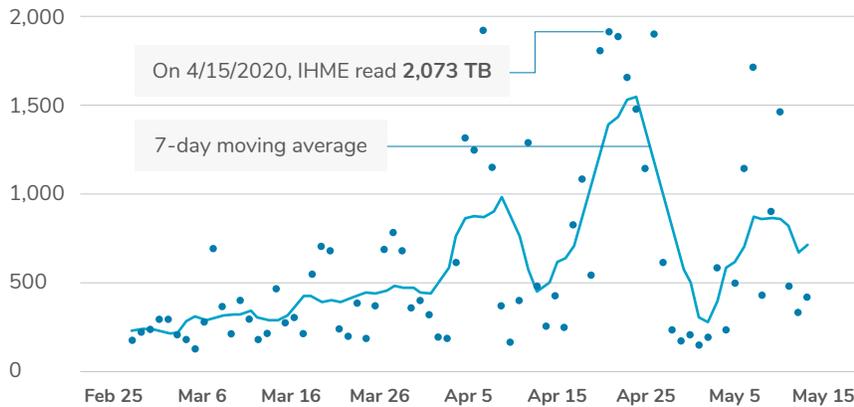
## Qumulo Delivered When the Pandemic Hit

Prior to COVID-19, the Qumulo system was already capturing and processing large amounts of data for existing research deliverables. For example, the disease mapping project alone accounts for nearly 2PB of data.

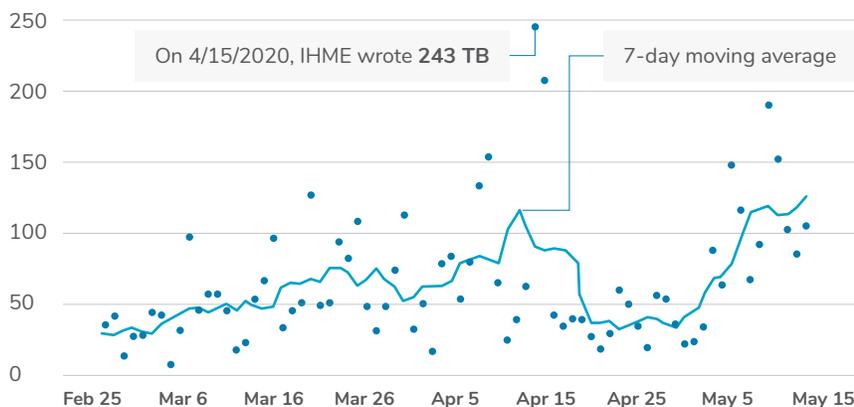
The agility of Qumulo's architecture enabled IHME to accommodate the sudden growth in both data ingest and processing demands without the need to re-architect.

**Both reads and writes have accelerated since the early days of the pandemic.**

### IHME: Terabytes read per day from Qumulo



### IHME: Terabytes written per day to Qumulo



## Looking Forward: A New Model Incorporates Even More Data

IHME has announced a multi-stage hybrid modeling approach that includes estimating COVID-19 deaths, infections, and viral transmission in multiple stages. A new component will capture not only fatality rates but the rates at which individuals move from being susceptible, to exposed, to infected, to recovered (the SEIR cycle). The new model will also compare transmission parameters to key drivers of pandemic trends such as outside temperature, the percentage of people living in dense areas, and human mobility.

This information will drive quantifiable evidence for social distancing policies by location, a major advance in protecting the population against COVID-19 while jumpstarting local and regional economies.