

Introducing data transport malleability into Hawai'i's electronic laboratory reporting systems during Omicron



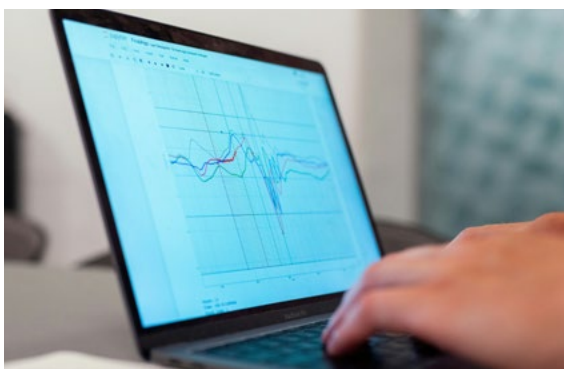
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CATEGORY: Laboratory Data Exchange

Following January 1, 2022, Hawai'i had reached a positivity rate of ~20.251% as the original Omicron COVID-19 variant contributed to a large up-tick in both disease testing and positive results. Hawai'i Department of Health's (HDOH) electronic disease surveillance system, Maven, began to experience the start of severe system issues.

The "What"

On January 11th, Maven's application server continuously stalled and forced restarts of the production system. This cycle continued, with the Informatics and Information Technology (IT) teams working in tandem to isolate areas of relief from not only a system perspective, but data intake management. Eventually, a decision was made among these two teams, the disease surveillance groups, and the State Epidemiologist—the Informatics group was tasked with stopping ingestion into Maven of all COVID-19 negatives, regardless of test type.



Within a 24-hour period, the data transport routes of the data integration engine, Rhapsody, were rewritten to allow the diverting of all COVID-19 negatives into a safe drop-point existing within our system environments. This prevented all COVID-19 negative records from entering the transport routes to both the data warehouses and Maven itself, going into effect on January 15th.

On January 18th, the Informatics and IT teams adjusted these new routes further to allow all negatives into the data warehouses. This was to allow for the ability to query and generate COVID-19 metrics for external use. During this process, Hawai'i identified that antigen negatives accounted for roughly 21% of transported data into the both the surveillance system and data warehouses. The Informatics team continued to take measurements of data flow during January 18th-25th to validate against historical time periods in which Maven was not strenuously under load to better understand the upper limits of the surveillance system.

The "So What"

During this review of historical metrics, two areas of disparity were addressed. Acknowledging that certain negative data is a necessity to generate positivity rates, namely those resulted under polymerase chain reaction (PCR) tests, the team created a logic workflow within the integration engine to allow what is identified as "negative logic" to filter out only antigen negatives by an inverse association,



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separated from PCR testing. This was via a created “COVID Filter” consisting of all Logical Observation Identifiers Names and Codes (LOINC), then separating via varied routes along LOINC identification for PCR, antigen, antibody and combination panels. Under this logic, the PCR negatives were reintroduced into the surveillance system, whereas antigen negatives were precluded from entry, to be stored server-side. Following extensive and comprehensive testing to ensure no outliers allowed unexpected data through, as Maven’s capacity to intake data while not being under load existed on a razor thin margin during this time, the integration engine changes were pushed into production. Maven began ingesting the full scope of PCR resulted tests on January 24th under careful watch.


The “Now What”

Following the Omicron surge, the Informatics Team continued to refine the “COVID Filter” logic, transforming the schema into one that embodies modularity. HDOH now has Rhapsody Integration Engine route logic to handle all future surges in an agile and flexible fashion and swiftly filter out records of any disease type and result without loss of data, as needed. This is split among the many intake routes, including the AIMS/ Interpartner routes through the Association of Public Health Laboratories (APHL) S3 transport, Hawai’i Health Information Exchange (HHIE), and HDOH’s external Lab Reporting Portal, a non-standard data reporting web portal which is funded

by the Epidemiology and Laboratory Capacity (ELC) cooperative agreement allowing the quick ingestion of data from school systems and other outside entities that are not yet technologically capable of sending standard (HL7) messages.

HDOH’s surveillance systems for disease outbreak are now equipped to transition into a hybridized approach of data ingestion and processing to generate percent positivity rates and other metrics. Hawai’i is prepared for flexible responses to unexpected spikes in testing volume changes for future conditions, when the next occasion should so arise.

Key contributors to this effort include: Disease Outbreak Control Division Epidemiologists; Health Data and Informatics Office; Informatics and Data Science Teams; Information Technology Staff

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