

Case Study on the e-infrastructure built leveraging cloud computing resources to prepare and provide rapid response to COVID-19 at a top-tier Higher Education Institution (HEI) in the USA (Remote presentation)

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From a Public Health perspective, the once-in-a-century Sars-CoV2 (COVID-19) pandemic created unprecedented challenges for Higher Education Institutions (HEIs). HEIs in the USA had to respond rapidly to switch from a mostly in-person mode of instruction to a fully remote mode. These changes had to be immediate and imminent to provide education with less to no impact on the health and safety of the campus community. At one of the top-tier research institutions in the USA, also called a “Public Ivy” school, with about 40,000 enrolled students in an academic year, the University of Maryland’s response to the COVID-19 pandemic highlights the timely establishment of an e-infrastructure that leveraged cloud computing resources with efficient communication strategies to provide real-time updates to the community stakeholders. The strategies were implemented swiftly by adhering to the Public Health guidelines put forth by the Centers for Disease Control (USA), the State of Maryland, the County officials, and the University System of Maryland. Immediately upon understanding the magnitude of the crisis, the University’s pandemic response began with an implementation of a cloud-based medical symptom monitoring web survey which eventually transformed seamlessly into a multi-faceted enterprise-wide web application suite catering to all facets of the University communities such as students, faculty, staff, university health center employees, integrating with public health officials, state and federal COVID-19 testing and vaccination reporting centers. As mandated by several government agencies and the University’s health center, the e-infrastructure project requirements were to be highly available, exhibit elastic scalability, be fault-tolerant, and be accessed worldwide. These were required by the institution to report daily compliance status for thousands of individuals accessing the web application round-the-clock to ascertain their return to campus status based on several factors such as mandatory reporting of testing results (twice a week), the exhibition of symptoms related to COVID-19, submission of vaccination information, and to report close contacts information for contact tracing. The cloud-based web application suite evolved with the development of the pandemic stages by integrating with external vendors and University’s health center database—to import testing results and vaccination records from the State of Maryland’s database hub and the University Health Center’s testing and vaccination data respectively. The application also harnessed cloud-based web reporting tools to provide the general public with an overview of the situation and the internal leadership community with several detailed reports to enable appropriate and timely decision-making. This high-performance e-infrastructure enabled the institution to efficiently identify campus community individuals who are compliant and non-compliant with the COVID-19 guidelines. Some parts of this application suite were also leveraged to be interactive enough for specific campus communities such as supervisors to communicate directly via emails to identify non-compliant individuals. This study performs a unique detailed case study analysis on the strategies, processes, and technologies used to establish an end-to-end e-infrastructure that plays a vital role in managing, maintaining, and controlling the spread of the deadly pandemic within the top-tier HEI campus community. The results of these diligent efforts could be seen with fewer COVID-19 positive test results, fatalities, and eventually becoming one of the highest vaccinated communities within the state.

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