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### Mero Technologies Tests their IoT Solution at Scale in Preparation for Commercial Growth

Mero Technologies has developed a full Internet of Things (IoT) solution, including sensors, hubs, and multi-user access platform, to monitor facility management, first focusing on restroom supplies and maintenance. Through a CENGN project, Mero used CENGN's commercial grade infrastructure and technical expertise to scale-test their solution to ensure it can meet the demands of large potential enterprise clients.

Founded by two Queen's University graduates, Mero Technologies is a startup company located in the Innovation Park at Queen's University in Kingston with the mission to fundamentally change the way buildings are managed. Mero enables property managers to maintain buildings and have insight into their labour with real time and money saving supply status alerts. This solution has been proven in the field at major commercial sites and allows property managers to avoid playing catch-up by knowing exactly when supplies need to be restocked.

## PROPERTY MANAGEMENT PREDICTING ISSUES WITH SUPPLIES, CLEANLINESS, AND STAFF

Today's property managers rely on rigidly scheduled cleaning and supply restocking in order to ensure their buildings remain in top condition. Unfortunately, this approach causes staff to have to carry out over the top maintenance, just in case there is abnormal usage of supplies, and even worse, does not sufficiently take into account surprise influxes leading to shortages. Without proper monitoring tools, managers are forced to overspend on maintenance just in case or suffer the consequences.

Through Mero's back-end application, property managers are provided supply levels and cleanliness ratings in real-time. Staff members are connected to the Mero platform through their mobile device and are alerted when issues arise, as well as being provided Al-powered predictions and recommendations on when restocking and cleaning will need to take place in each location. By utilizing this time-saving solution, along with Mero's in-depth data analytics, Mero's clients have saved 30% of their costs on supplies alone. Beyond monitoring supplies and cleanliness, the IoT solution also provides scheduling and employee performance insight to property managers, allowing them to keep a transparent relationship with both their staff and the state of their buildings.



Figure 1: Mero's mobile application

#### **MERO'S JUST-IN-TIME SOLUTION**

Mero's solution works through retrofitting sensors to existing fixtures that monitor product levels of consumable items such as paper towels and soap. The sensors communicate over Bluetooth to a Mero Basestation, which then pushes the data through Wi-Fi and LTE to the Mero Server.

The Mero Server hosts the customer data, providing a multi-role platform for staff and property supervisors to track, gain insights and be alerted on supply levels, scheduling, employee performance and cleanliness of the facility. The platform works both as a mobile-friendly app so staff on location can react to alerts right away and on desktop for more in-depth analysis and planning.



Figure 2: Deployment of Mero solution on commercial building



#### VALIDATING AT SCALE THROUGH A CENGN PROJECT

As a company, Mero is on the commercial path to success, already providing its solution to several enterprise clients. To reach the next level of growth, the startup needs to validate their solution at scale, identifying any bottlenecks or performance issues the Mero Server may have as the number of sensors are increased. Mero took their requirements to CENGN and developed a project testing the Mero Server while it received data and requests from 100,000 sensors and 2,500 concurrent users. This way, Mero could analyze the scale bounds of the server and identify any barriers to scaling.

#### **PROJECT SETUP AND EXECUTION**

CENGN provided Mero with a dedicated project space in its infrastructure with four virtual machines (VM) set up in a cloud tenancy environment. The first two VMs hosted the Mero Platform divided into the Mero Database and Server. The third VM simulated the traffic of the sensors and users in real-world deployments. With these three VMs effectively modeling the Mero solution and the traffic from its customers, one final VM was added for monitoring. This VM monitored the Mero Server so that the company could identify the resources required as they incrementally increased the sensor and user count to reach their desired end goal of 100,000 sensors and 2,500 concurrent users. The project testing also included 150 real sensors on 10 Mero access points, effectively augmenting the simulated data with actual traffic.

The following testing was completed to validate Mero's functionality and resource requirements with different sensor and user loads:

- Incremental load testing of sensors
- Incremental load testing of users
- Feature testing under incremental loads

#### ON THE PATH TO COMMERCIAL GROWTH

Through this CENGN project Mero Technologies was able to learn vital information about their solution. First, through the scale testing on CENGN's infrastructure, Mero learned their platform can handle 375 active users, roughly translating to the 2,500 concurrent user target. Although Mero did not end up scaling to limit, through testing they were able to identify that their solution could easily handle 100,000 sensors in deployment.



Figure 3: Mero's Project Setup on the CENGN Infrastructure

Mero was also able to identify their platform's consumption rate through the CENGN testing, allowing them to forecast an accurate amount for their future expenditures on the minimum hardware to support a specific load. They learned all their potential costs and therefore were able to figure out optimal pricing, as well as forecasted the scalability of the existing solution without significant development time. Lastly, the CENGN project allowed Mero to make significant product improvements in the least cost phase of their product development, which will provide huge savings before deployment.

Through completing this CENGN project Mero was able to seal two more contracts for their solution due to proving the product supports a commercial level of users and sensors. By leveraging CENGN's infrastructure, technical, and exposure services, Mero Technologies has validated the performance of their solution at scale and improved their technology, allowing them to increase their potential market and cater to larger clients.



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