



Title: Research training program on “Comprehensive overview of capabilities of materialize solutions and hands on session”

Target audience: Researchers and faculty

Date: 23rd to 25th September 2024

Time : 10 am to 3.30 pm

Venue : Lecture halls, Training center, conference room, VEDAS Lab

Resource person: Experts from Materialise solution

REPORT

MGM Dental College and Hospital conducted a Research Training Program on “Comprehensive Overview of Capabilities of Materialize Solutions and Hands-On Session” was organized to provide participants with a deep understanding of Materialize, a powerful toolset for handling data transformation and stream processing. The event aimed to familiarize researchers and developers with the capabilities of Materialize solutions, with a focus on real-time data handling, streaming SQL, and how Materialize can enhance modern data pipelines. Additionally, the program included a hands-on session where participants had the opportunity to implement their learning. This report provides an overview of the program, the key learnings, the practical sessions, and feedback from participants.

Objectives of the Training Program: The training program was designed with the following objectives:

- **Overview of Materialize Solutions:** To introduce Materialize and its core features, including its ability to manage and process real-time data using streaming SQL and materialized views.
- **Hands-On Experience:** To provide participants with an opportunity to engage with Materialize solutions through a guided hands-on session, ensuring they gain practical experience.
- **Best Practices and Optimization:** To cover best practices for working with Materialize, including optimizing queries, managing resources efficiently, and troubleshooting common issues.
- **Interaction and Collaboration:** To facilitate interaction and networking among researchers, data engineers, and developers to foster collaborative learning.



PROGRAM STRUCTURE:

A. Lecture and Presentation (Overview of Materialize Solutions)

The first part of the program focused on providing participants with a comprehensive introduction to Materialize solutions. Key topics included:

1. Introduction of Materialize

An overview of the platform, its architecture, and its focus on real-time, stream processing. Materialize enables developers to run SQL queries on live streaming data while maintaining a consistent and updated view of the data in real-time.

2. Core Capabilities:

The presenters discussed Materialize's core capabilities, such as:

- Real-time data processing and stream-to-batch conversion.
- Materialized views that are continuously updated with incoming data.
- Seamless integration with modern data pipelines and technologies such as Kafka, PostgreSQL, and other data lakes.

3. Imaging & Data Integration

- **Medical Imaging Data:** The system needs to accept and process various medical imaging modalities such as **CT scans, MRI, X-rays, CBCT, and ultrasound.**

Features: Ability to import DICOM files, process high-resolution 3D volumetric data, and create a detailed digital representation of the patient's anatomy (e.g., bones, soft tissues, vascular structures).

- **Data Fusion:** Combining different imaging modalities to create a complete picture of the surgical area.

Features: Automatic fusion of CT and MRI scans, multi-modal image registration, and alignment to create a more accurate 3D model of the surgical site.

4. 3D Model Creation & Simulation

- **Anatomical Modeling:** Convert the patient's imaging data into a 3D anatomical model that is precise and customizable.



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Features: AI-powered segmentation for automatic or semi-automatic delineation of bones, tissues, organs, and other structures. Surgeons can refine the model for more accurate planning.

- **Model Customization:** Surgeons can adjust the digital model based on patient-specific needs.
- *Features:* Tools to resize, rotate, and view the model from different angles. Customization for different anatomical conditions (e.g., tumor size, deformities, fractures).
- **Surgical Simulation:** The system should offer the ability to simulate different surgical approaches and techniques.

B. Hands-On Session

In the second part of the program, participants engaged in a hands-on session where they could apply the concepts discussed in the lecture. During this session, participants:

- Set up a Materialize instance, integrated it with a streaming data source (such as Kafka), and created materialized views.
- Worked through practical examples, including creating and optimizing real-time data pipelines.
- Explored query optimization techniques to handle large data volumes efficiently.
- Collaborated in groups to tackle different challenges and tasks provided during the hands-on workshop.

PHOTOGRAPHS (Day -1)

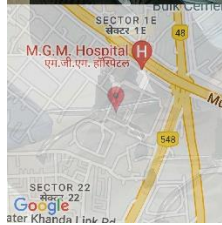
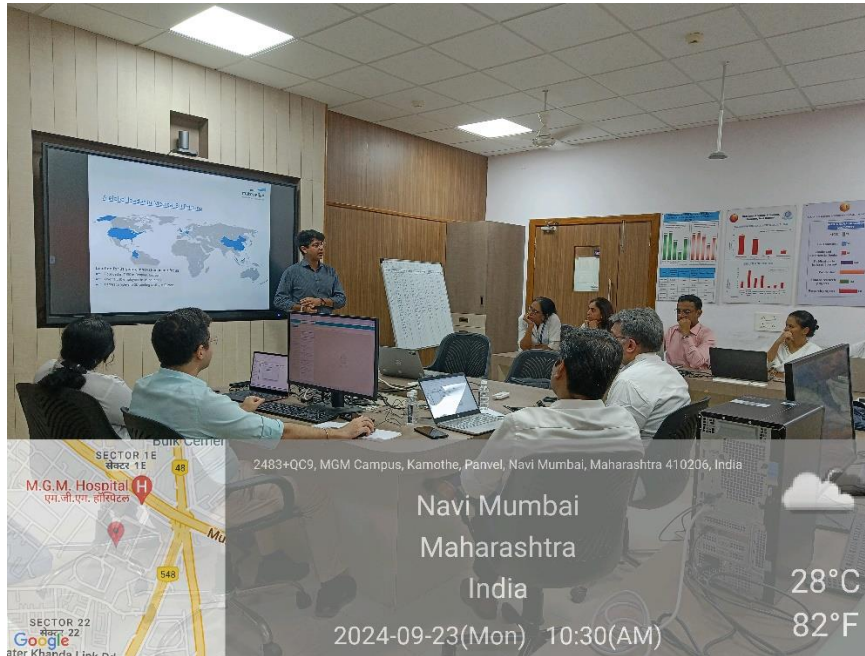


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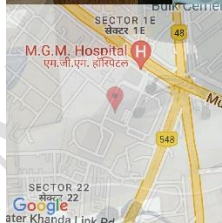
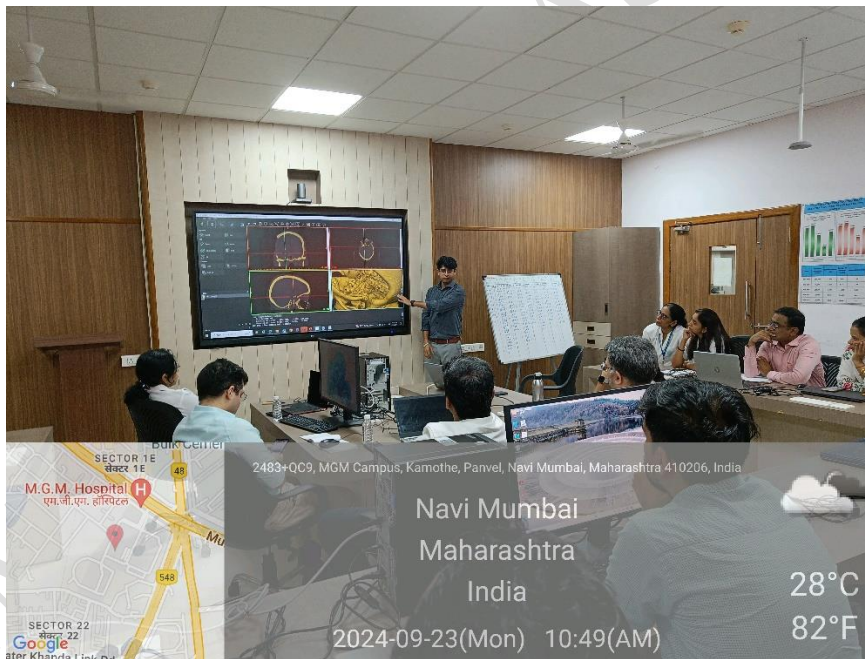


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DETAILED EXPLANATION OF MATERIALIZE SOLUTION SOFTWARE BY EXPERT

PHOTOGRAPHS (Day -2)



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DEMONSTRATION OF MATERIALIZE SOFTWARE TO THE PARTICIPANTS

PHOTOGRAPHS (Day -3)

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PARTICIPANTS IN HANDS ON PROGRAMME

PARTICIPANTS

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