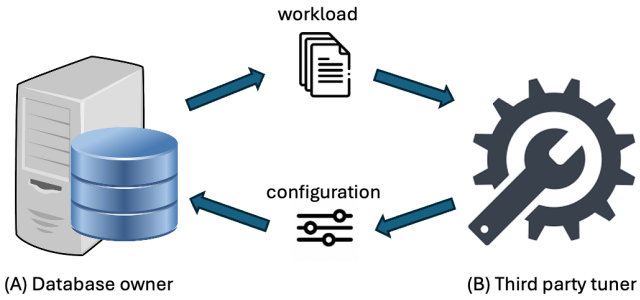
CAS CS 561: Data Systems Architectures
Data-intensive Systems and Computing Lab
Department of Computer Science
College of Arts and Sciences, Boston University
http://bu-disc.github.io/CS561/

CS561 Spring 2025 - Research Project

Title: Privacy-preserving Database Tuning

Background: The Databases typically need tuning to provide optimal performance. Generally, the database administrators tune the configurations based on the workload characteristics. However, recent research has proposed an automatic tuning framework, Endure, that is designed for LSM trees. Endure is robust and performs well even in the presence of workload uncertainty.



Objective: The purpose of this project is to evaluate how tuning framework like Endure can work with differentially private data. Imagine two parties: **A** and **B.** Party **A** owns the database and party **B** represents a third-party service like Endure that provides database tuning service. Therefore, party **A** needs to send the workload characteristics to the party **B**. However, party **A** may not want to share the workload information directly due to the privacy concerns. Therefore, party **A** sends differentially private data by adding noise to the original workload.

Steps: This project would involve experimenting with Endure framework. It would also require the researchers to get familiar with the differential privacy. Here we provide few starting points for the project:

(a) Create a workload, Ω, and perturbate it by ε to generate a differentially private workload, Ω_e.
(b) Use Endure with the differentially private workload, Ω_e, to determine the optimal configuration, Φ_e.
(c) Compare the performance of Φ_e, generated based on perturbed workload, with Φ, generated with original workload.

Responsible Mentor: *Andy Huynh*

References:

[1] Andy Huynh, Harshal Chaudhari, Evimaria Terzi, Manos Athanassoulis. 2022. "Endure: A Robust Tuning Paradigm for LSM Trees under Workload Uncertainty" Proc. of the VLDB Endowment, Vol. 15(8), 2022. https://vldb.org/pvldb/vol15/p1605-huynh.pdf