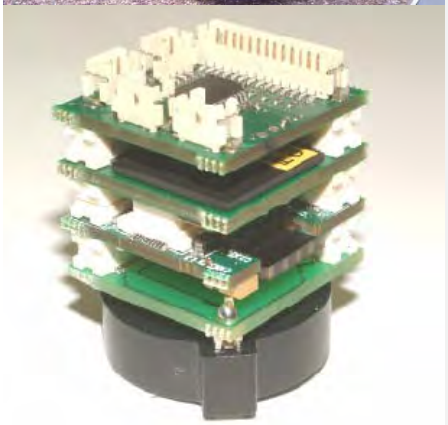
HEA
Higher Education Authority
An tÚdarás um Ard-Oideachas

RESEARCH PORTFOLIO



PRTLI 5

Programme for Research
in Third-Level Institutions

UCC University College Cork, Ireland
Coláiste na hOllscoile Corcaigh
School of Engineering

http://zuse.ucc.ie/grep

HEA
Higher Education Authority
An tÚdarás um Ard-Oideachas

BUILDING PERFORMANCE MODELLING

Abstract

For Facility Management (FM) companies, Information Technology (IT) is becoming important. Clients demand that their buildings perform more efficiently and desirable FM contracts are awarded to FM companies who fulfil these requests. IT equipment is being used to monitor energy consumption within a building.

This allows a Facility Manager to analyse the data, benchmark it against similar buildings and offer the client modernisation procedures for the appropriate systems. Initial projections estimate, that for a FM company that is operating 1000 buildings, the amount of data collected after 5 years will be around 2.5 billion datasets.

Figure 1: Dimensions Derived from BIM

Objective

This research aims to deliver a standardized method to acquire the performance data of a building. It discusses the infrastructure needed to harvest data from the buildings and store it in a centralised, efficient Data Warehouse (DW) system.

The main focus will be on analysis functions that are running on top of the DW. Their objective is to support the Facility Manager with clear and understandable visualisations and process the huge amount of information for him in a convenient and non-time intensive way.

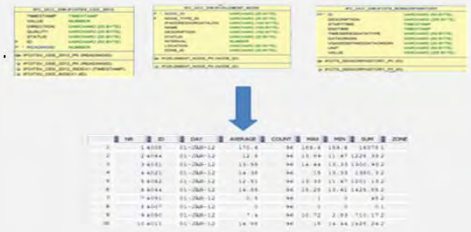


Figure 2: Amalgamating BIM and Monitoring Data

Approach

CONSOLOIDATION OF INFORMATION:

- Information is usually spread across multiple tables
- A Materialized View (MV) consolidates data
- MV's can be modelled for individual data representations
- Unneeded data gets ignored in the MV
- MV's allow to pre-calculate data for quick access

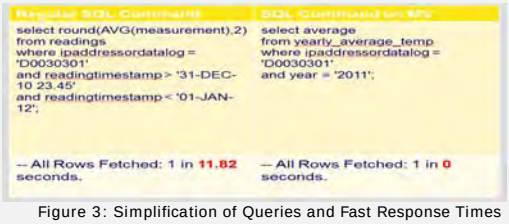


Figure 3: Simplification of Queries and Fast Response Times

Materialized Views & Cubes

The Data Warehouse (DW) is used to pre-calculates Performance Indicators (PI) in Materialized Views.

The performance gain for using DW-technology compared to regular SQL commands is huge (cf. figure 3)

Results

Creating a Data Warehouse Cubes

- A cube consists of a fact table (w. measured data) and
- Dimensional data, e.g. time, zone, system (cf. figure 1)

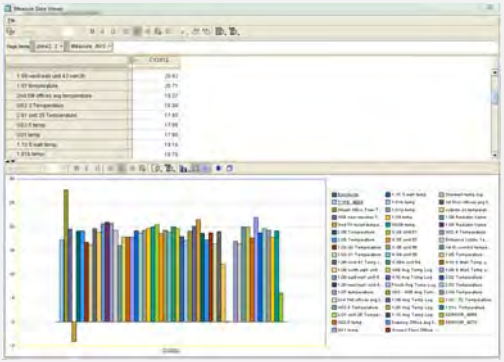


Figure 5: Complex Analysis Results
(UnderPerformance Indicator – UP_{temp} for one floor)

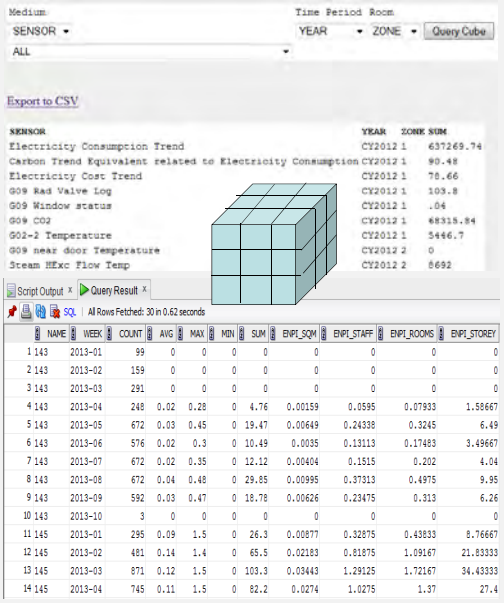


Figure 4: Example for Using Cubes
(Energy Performance Indicators for one building)

Contact:

IRUSE Researchers:
Stephan Hoerster, MSc.
s.hoerster@ucc.ie

Mentor: Prof. Karsten Menzel
University College Cork
Informatics Research Unit for Sustainable Engineering
CORK, Ireland
k.menzel@ucc.ie

UCC University College Cork, Ireland
Coláiste na hOllscoile Corcaigh
School of Engineering

http://zuse.ucc.ie/grep