Course Evaluation Middleware

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The problem it solves

The problem: we have no automated means of formatting and inserting U of T registration data into Blue, necessitating many hours of tedious, error-prone manual data preparation every term.

The solution: developing our own *middleware,* i.e., software that reads data from U of T's systems, reformats it as required for Blue, and inserts (or updates) it in Blue, with minimal need for human intervention.

"Middleware" because it sits in the middle, between our registration system's database and the Blue database, and moves data from the former into the latter.

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Background of the problem

- **U of T's current Course-evaluation system started with just a few divisions**
  - This relatively small project was manageable by a few non-technical staff who devised their own ad hoc solutions to handle the complexities of the registration data.

- **The data tool available to everyone involved was MS Excel**
  - Because it was possible to prepare data for Blue using Excel, a set of practices was developed wherein carefully selected rows from huge U-of-T spreadsheets are copied and pasted into differently formatted spreadsheets for Blue.

- **The system grew to support almost all of U of T's academic divisions**
  - The U of T provost's policy stipulates that each course at U of T will be evaluated by its students every time it is offered. As more divisions came on board our system, processes depending on manual data manipulation became unsustainable.

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A glimpse of our former working methods
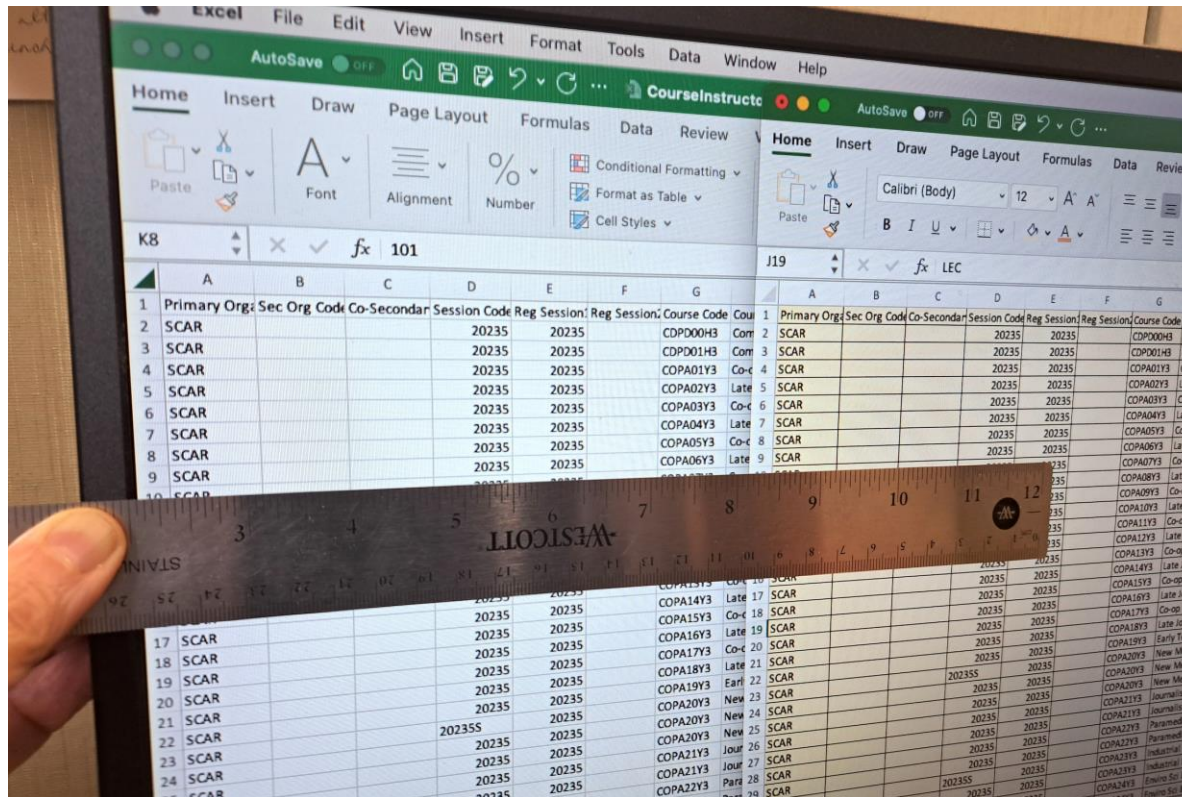
- A CTSI staff member holding a straight edge to a monitor displaying two carefully aligned Excel spreadsheets, to make sure both contain the correct rows.

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Middleware overview

| U of T student registration data and course instructor data | → | Middleware | → | Blue |

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Middleware data flow

1
U of T registration system (a.k.a. ROSI) contains the **authoritative data** about courses offered, students registered in them, and instructors teaching them.

2
ROSI data is exported to **5 CSV files**: Students, Instructors, Courses, Course-Instructors, Course-Students

3
Middleware's **Python script reads the CSV exports**, eliminates anything that is not evaluable, and reformats the evaluable records as necessary for Blue.

4
Middleware's **MS SQL database is populated with the reformatted data**. Middleware's 5 data tables are the same as Blue's, and as the ROSI exports: Students, Instructors, Courses, Course-Instructors, Course-Students

5
Blue is populated with data from the Middleware database.

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The data-reformatting done by the middleware

To make the registration data work for us, the Middleware script

- adds the correct **term identifier** to each course code, e.g., *Summer-2023;*

- **merges courses**, as specified by certain divisions.

- **splits certain courses**, so two separate evaluations are done when two instructors teaching the same course have been scheduled for evaluation at different times;

- **populates the *Program* field** based on data in other fields, thereby triggering specific questions in Blue, as specified by certain academic divisions;

- **populates the *Course* field**, based on instructions provided by the divisions, so that granular report-access restrictions can be applied to those specific courses;

- counts student registrations per course and **excludes courses with no registrants**;

- **excludes the non-evaluable**: instructors with no utoronto id, courses flagged non-evaluable by the division, and any duplicate records.

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How the middleware maintains coherent, accurate data

The middleware tries to ensure that the dataset it creates is coherent and accurate. It asks the following questions of the dataset it has created.

- Is there **a record in the *Students* table for every student** found in the Course-student table?

- Is there **a record in the *Instructors* table for every instructor** found in the Course-instructor table?

- Is there **a record in the *Courses* table for every course** found in the Course-instructor and Course-student tables?

It also **removes any earlier data made obsolete** by the latest import, e.g., student registrations or instructor assignments that have disappeared.

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How the middleware reports on what it has done.

Every time it runs, the Middleware. It **writes several documents reporting on anything noteworthy that has happened**

- any addition of *Course* or *Program* codes that were not part of the original data;

- any courses, instructors, or students found in a relational table but not in the corresponding object table;

- any records it excluded from evaluation, with the reason for exclusion;

- any courses it merged or split;

- a listing, for each division, of all courses and instructors being evaluated this term.

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A partial demonstration, and time for questions

Let's look at the middleware in action—we'll see is **a minimal version** that works one division at a time, which we've been using for the last year while the full version is being developed.

Are there **any questions?**