

Iliano Cervesato
iliano@cmu.edu



The Traditional Spreadsheet

- Simple access to complex *numerical* calculations
 - Intuitive interface
 - No formal training needed
 - Gentle learning curve
- Effective decision support for *numerical* data
 - Financial analysis, budgets, grades, inventories, ...
- Ubiquitous
 - Over 50M users
 - Only recently surpassed by web browsers and mailers



NEXCEL a Deductive Spreadsheet

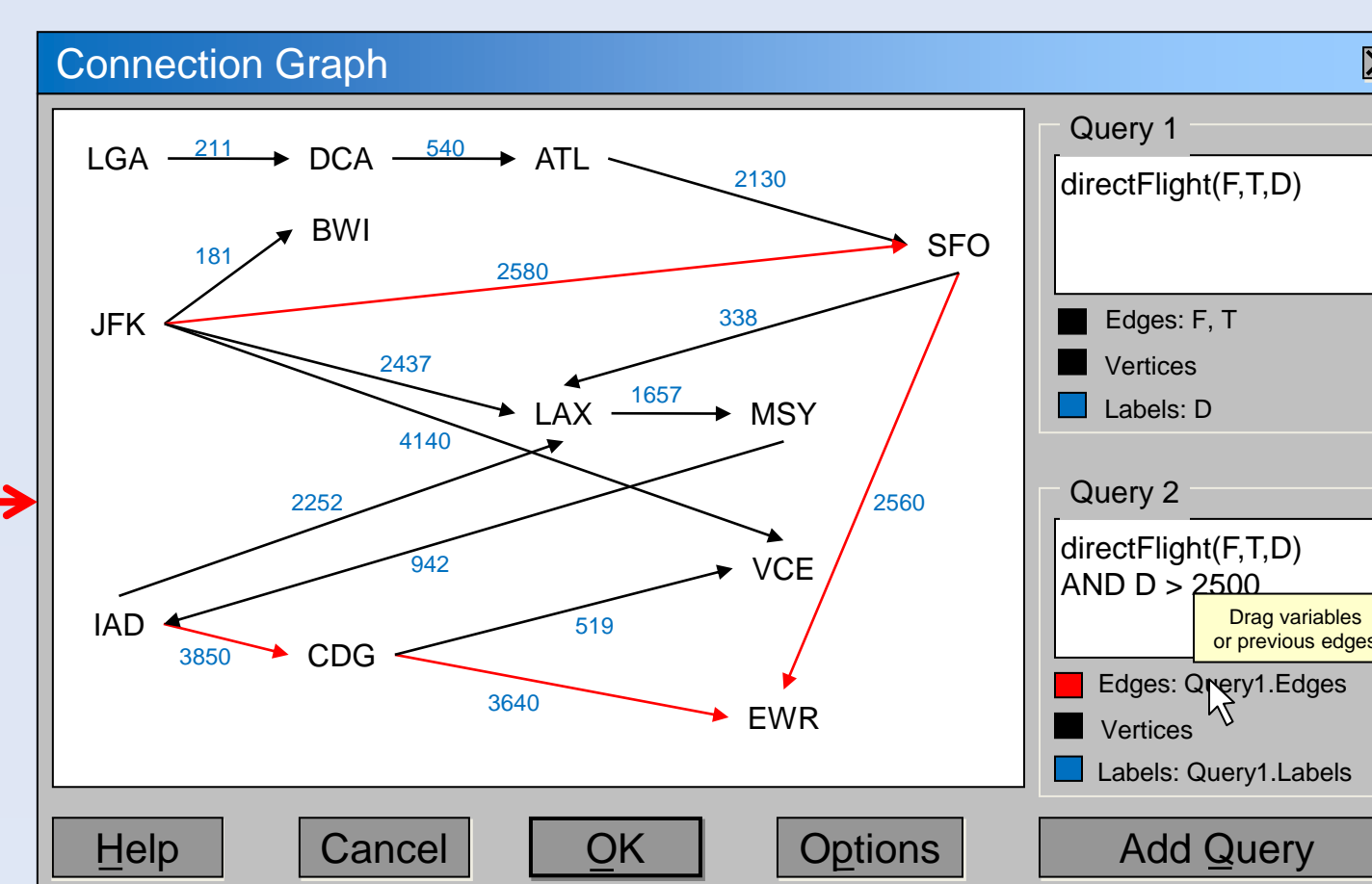
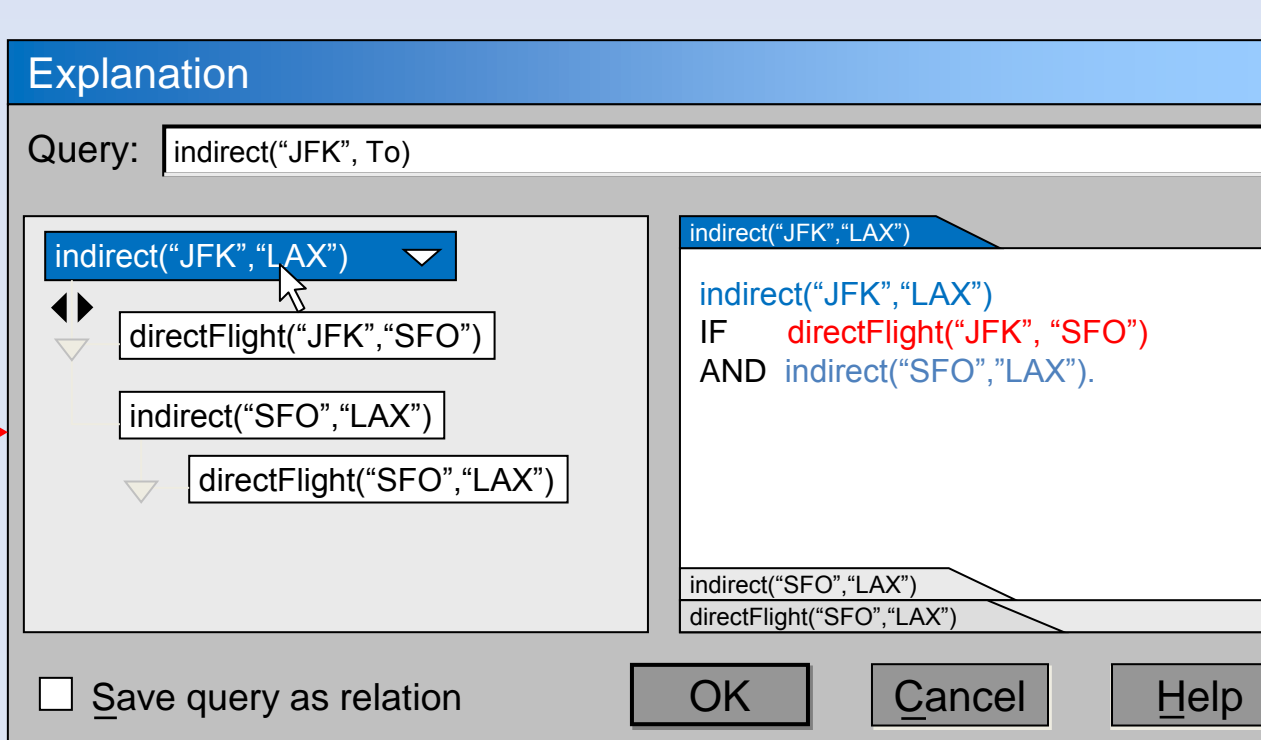
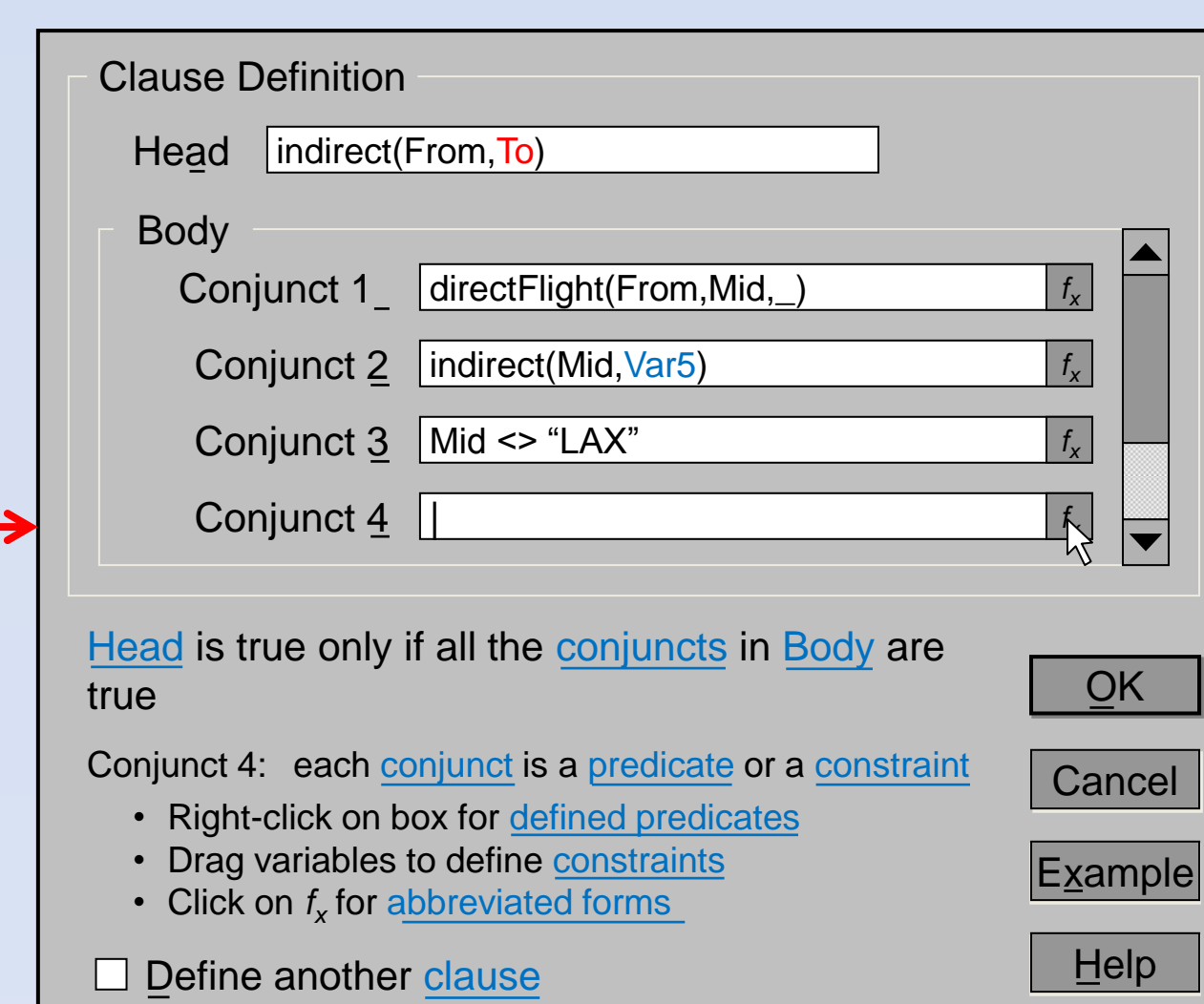
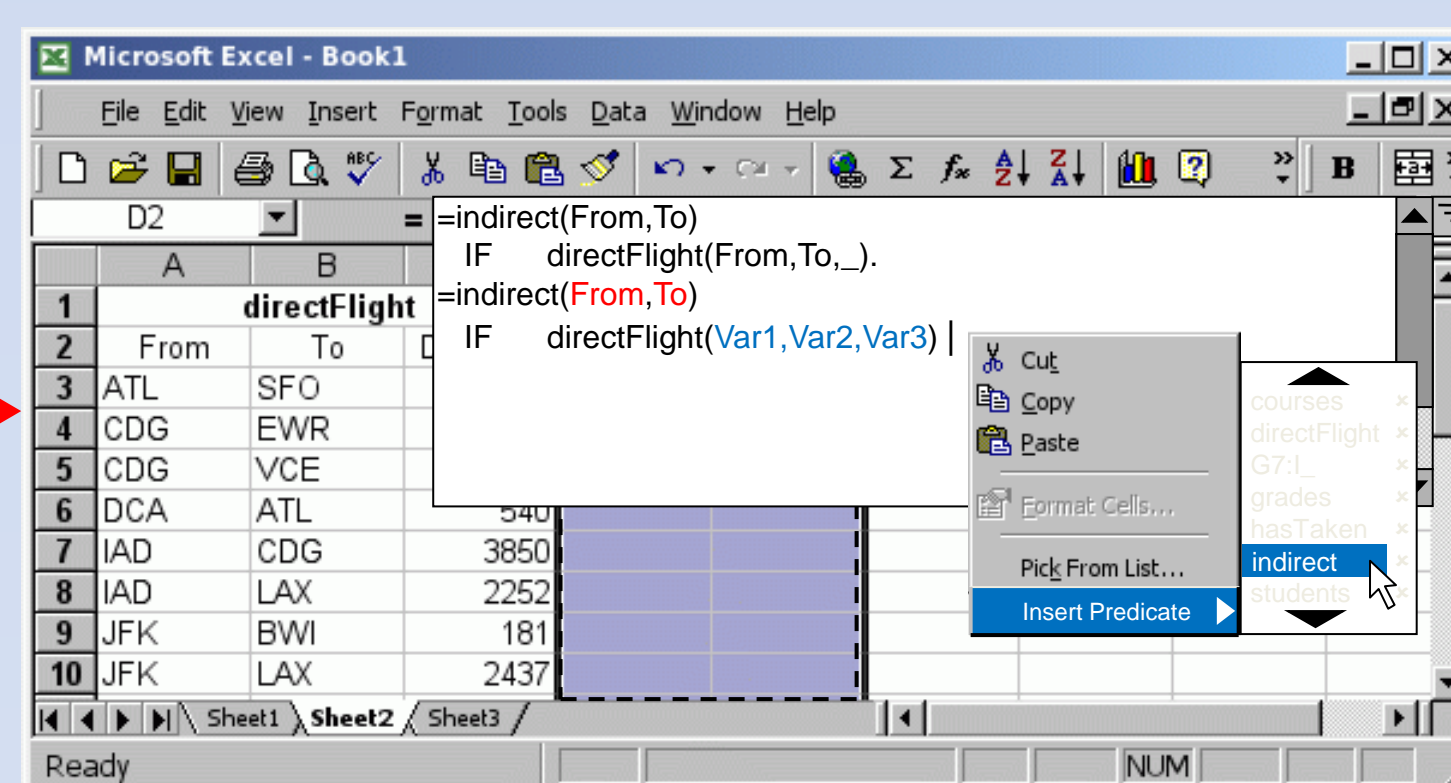
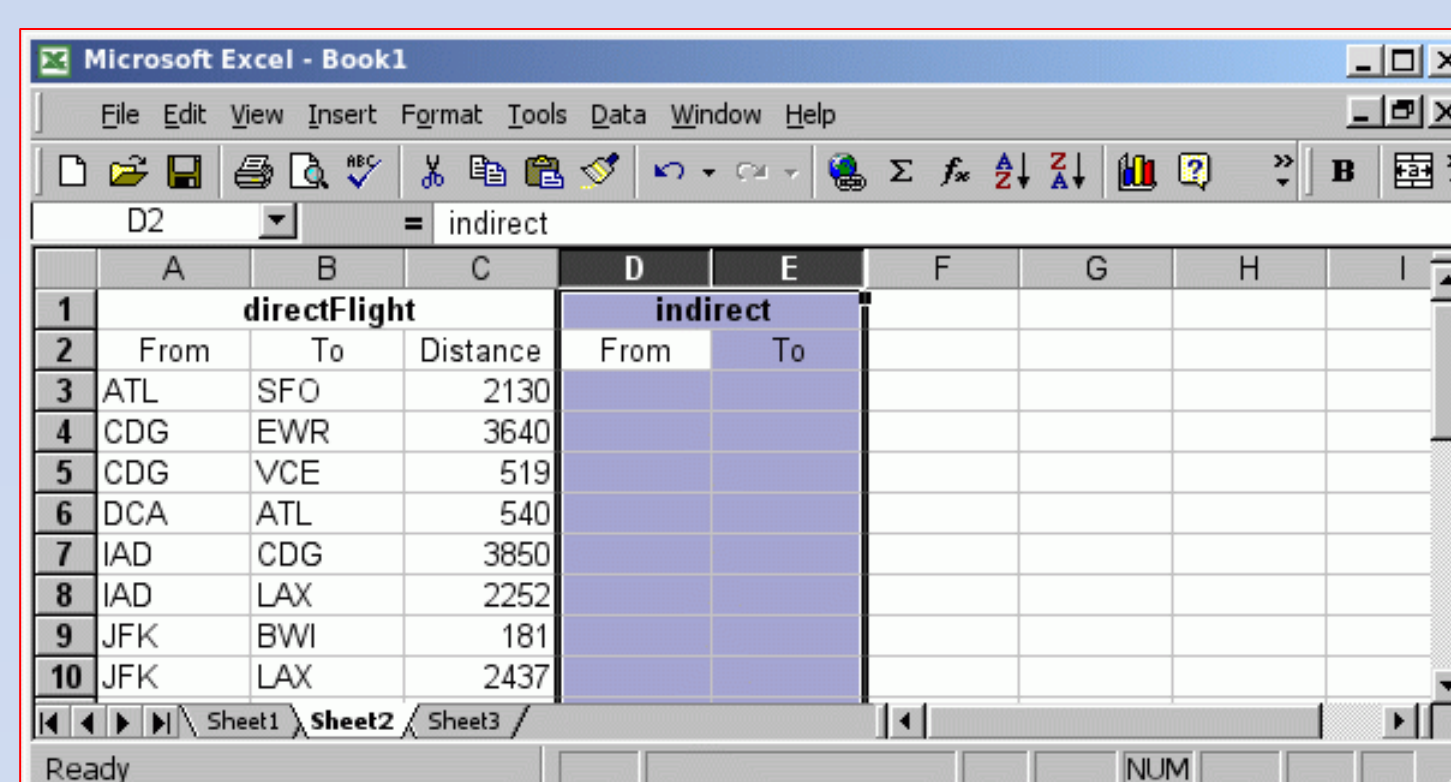
Forthcoming Work

- Implement prototype
 - All core functionalities
 - Detailed user-interface
- Perform usability analysis and user testing
 - Can it be as usable as traditional spreadsheet?
 - Heuristic evaluation and cognitive walkthrough
- Address open cognitive issues
 - User-friendly syntax of tabular formulas
 - Complex logical patterns, e.g., nested negations
 - Feature discovery

Work to begin in January 2011, funded by QNRF

The Deductive Spreadsheet

- Extends the spreadsheet with *symbolic* reasoning
 - Supports *symbolic* decision-making
 - Provides functionalities to manipulate data *symbolically*
 - Logical language
 - Operational interpretation
 - Interface commands
 - Same ease of use as traditional spreadsheet
- Seamless integration into current model
 - Not a separate application



NEXCEL User Interface

- Extension of the traditional interface with
 - Textual language over tabular expressions
 - Currently extended Datalog or beautified SQL
 - Final choice will depend on user testing
 - Mouse-assisted definitions
 - Wizard-assisted definitions
 - Explanation facilities
 - Based on terminating top-down logic programming
 - Productivity tools
- Good feedback from preliminary user testing

Examples of Applications

- Build course sequence based on offerings and prerequisites
 - Workflow problem
- Find itinerary based on flight segment
- Explore family genealogy tree
 - Transitive closure problems
- Explore exposure to industries in mutual fund portfolio
 - Bill of materials problem
- Coordinate meetings and transportation for business trip
 - Scheduling problem

Unachievable using traditional spreadsheets

NEXCEL Functionalities

- Extension of the traditional spreadsheet with
 - Expressions over first-class tabular data
 - Datalog with negation, constraints, calculated values, lists
 - Equational relational algebra (extended)
 - Like database, but queries results permanently displayed
 - Efficient evaluation and update propagation
 - Guaranteed termination
 - Explanation facilities