

Case-Study: A Web Site for a Local Council, Built as a Database Driven Web Resource

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Preamble

- data
 - digital representations of the information/knowledge that has to be communicated/given to users
- meta-data
 - digital representations of the descriptions of data that are required by software agents in "reasoning";
 - meta-data is not "directly received" by human users; it is perceived only through the functionality of the system/site

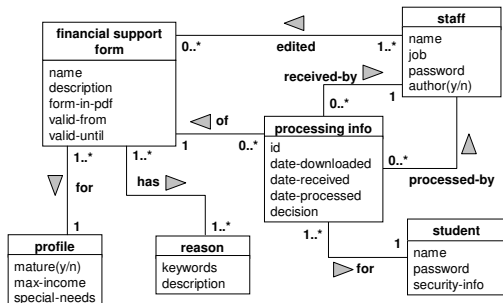
Generalities

- two tier architecture (database centred)
 - data and meta-data are together stored in the database
 - meta-data is not made available on the web; it is only used locally, by the system
- the expressive power of a relational database with respect to meta-data is limited
 - better ways of expressing meta-data result in better automatic reasoning
 - *considered later*
- meta-data available on the web
 - increases interoperability (knowledge/information sharing)

Starting Scenario

- create a web service whereby:
 - students get an application form for financial support that is relevant to their circumstances
 - the form is to be provided in pdf
 - the web interface can adapt itself to students with special needs (*not accounted for in next diagram*)
 - students can check the status of their application
 - some members of staff can update the information regarding the valid application forms
 - information about past applications is not to be updated
 - ...
 - *interactive: any more requirements?*

Data (and Meta-Data) Modelling



Functionality Implemented in Front-End

- only staff who have 'author=y' can edit forms
- students are provided with a web-form whereby they enter 'mature(y/n)' and 'income' and select from drop down lists 'special needs' and 'purpose'
 - the drop down lists are compiled from the database
- when a student downloads a form, an 'id' for the processing information is automatically created and appended to the form; the 'date downloaded' is recorded automatically
- when a form is received, a member of staff inputs this date
- when a decision was reached, the 'decision' and 'date processed' are inputted by a member of staff
- students can always check the status of their application on line

Refine and Discuss the Previous Model

- enhance/refine the data model
 - identify new possible attributes, entities and relationships
 - note that some may be referred to as meta-data
- focus on meta-data
 - general domain descriptions "outside" the actual data model
 - organise staff roles in managerial structures and assign responsibilities and permissions to them
 - follow inheritance and aggregation in these hierarchies
 - refine a description of reasons (definitions of terms) in order to make inferences with them
 - e.g., 'ME is a disease'
 - these will increase the power of reasoning of the front-end

Need for Standard Meta-Data Vocabulary

- users (staff and clients) may change their geographical location
- if knowledge is to be shared, cross-references are necessary
 - assume we are on site A
 - "if reasons are <PQR>, then a special application may be made at site B under <xyz> conditions"
 - <XYZ> must be shared by A and B (<PQR may)
 - "if reasons are <PQR> then automatically send the form to site B and get <answer> from there"
 - <PQR> and <answer> must be shared by A and B
- *other reasons?*

Conclusions

- **all** data can be stored centrally in a database
 - meta-data does not need to be considered separately from data
 - the (local) behaviour of the system is as if the system were using meta-data
- more complex domain descriptions — meta-data — are not (easily) expressed in a database
 - a more refined language/syntax is required
- interoperability requires a standard language/syntax and meta-descriptions made available on the web

References

Connolly, T, Begg, C, Strachan, A, 2000, *Database Systems - A practical approach to design, implementation and management*, 3rd edition, Addison-Wesley. (for data modelling within the ER model)