A real world case study

- A top state university:
- 400,000 students,
- 44,000 faculty and staff
- at 23 campuses.
- contract with a enterprise software vendor:
- US$660 million
  (up from an earlier estimate of $440 million).
  cost per student: about US$1600.
- cost per employed user (i.e., faculty and staff): about US$15,000.

...makes me wonder:

- Do we only have these two extreme alternatives:

- Use just pen and paper
- Or spend 15 grand per staff

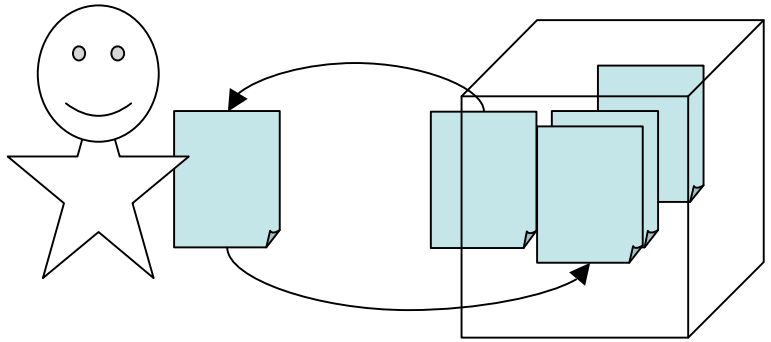
?

One idea

- Just replace paper with electronic documents.
- create a single structured document space.

advantages: certain non-functional properties might be improved:

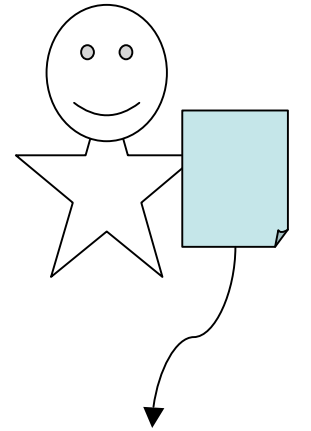
  - Persistence
  - Accessibility
  - non-repudiation

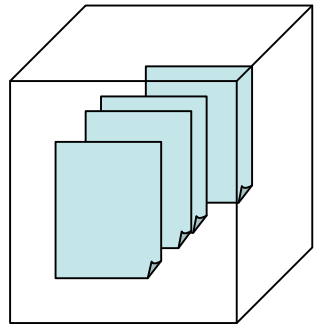


- groupware, computer-supported collaborative work (CSCW):
  - Wikis
  - IBM Lotus notes, MS Exchange

Second approach: memo-based

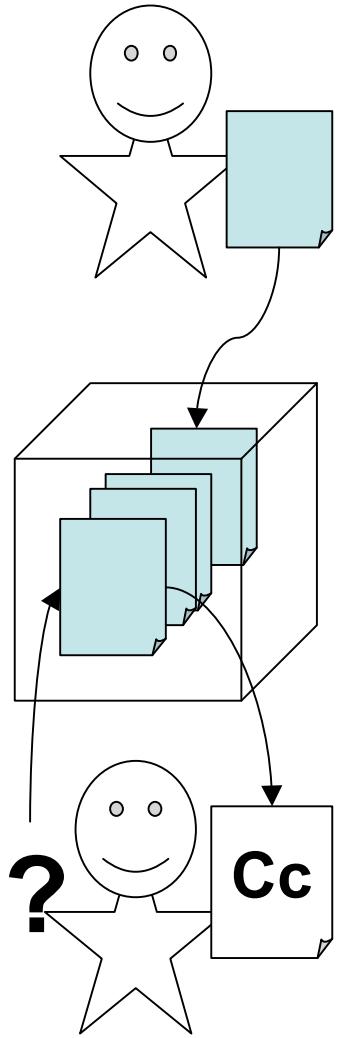
- The memo-based approach:
- People in organizations sign and issue documents: submit *memos*
  - taking responsibility for transactions
- Documents are immutable afterwards:
- All documents can go into a single store: The memo archive.





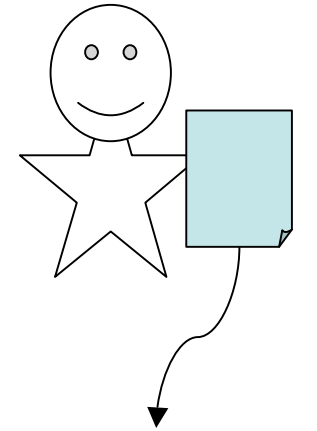
Memo-based implementation of CSCW

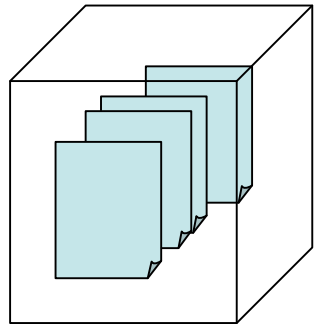
- Memos are interpreted as versions of documents.
- The memo archive stores just the successive versions of documents.
  - Immutable memory: good against viruses.
- The newest version is the current document.
- Document is just a key named by the memos.



Memos can implement messages

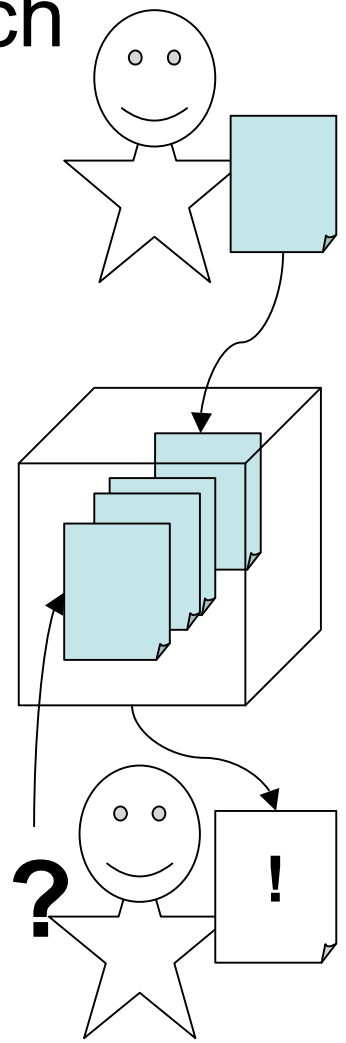
- Documents can go into a shared pool
- Receiver is mere “Attention to”.
- Nonfunctional requirement: non-repudiation: of sender and receiver.
- Like talking in a plenary.





Idea: The purist memo-based approach

- We use the memo-based approach to implement interactive systems:
- Systems generate content based on user input.
- The memo archive is the whole system state: contains all information necessary to know.
- All questions about current status can be answered as queries on this state.
- Could only contain user-generated memos.
- But can also contain automatic system generated memos.



Main semantic model

- People prepare and sign memos.
- In order to sign it, the memo must contain a complex information that makes sense.
- Hence the memos are semantic units, decomposition down to smaller units is not possible without loss of meaning.
- Hierarchical data model, where the memos are irreducible units.

certainly not the only model for computer applications

Terminology

- **Memo:** Signed, dated, immutable: persistency and non-repudiation applies.
- **Message:** memo sent from A to B, and received (but not necessarily processed).
- **Form:** if applied to instance:
  - *typed* message.

Example for the move to forms

- Example: Hotel reservation.
- Person wants to inquire availability at certain day.
- Hotel must check earlier reservations and cancellations, then sending availability to user.

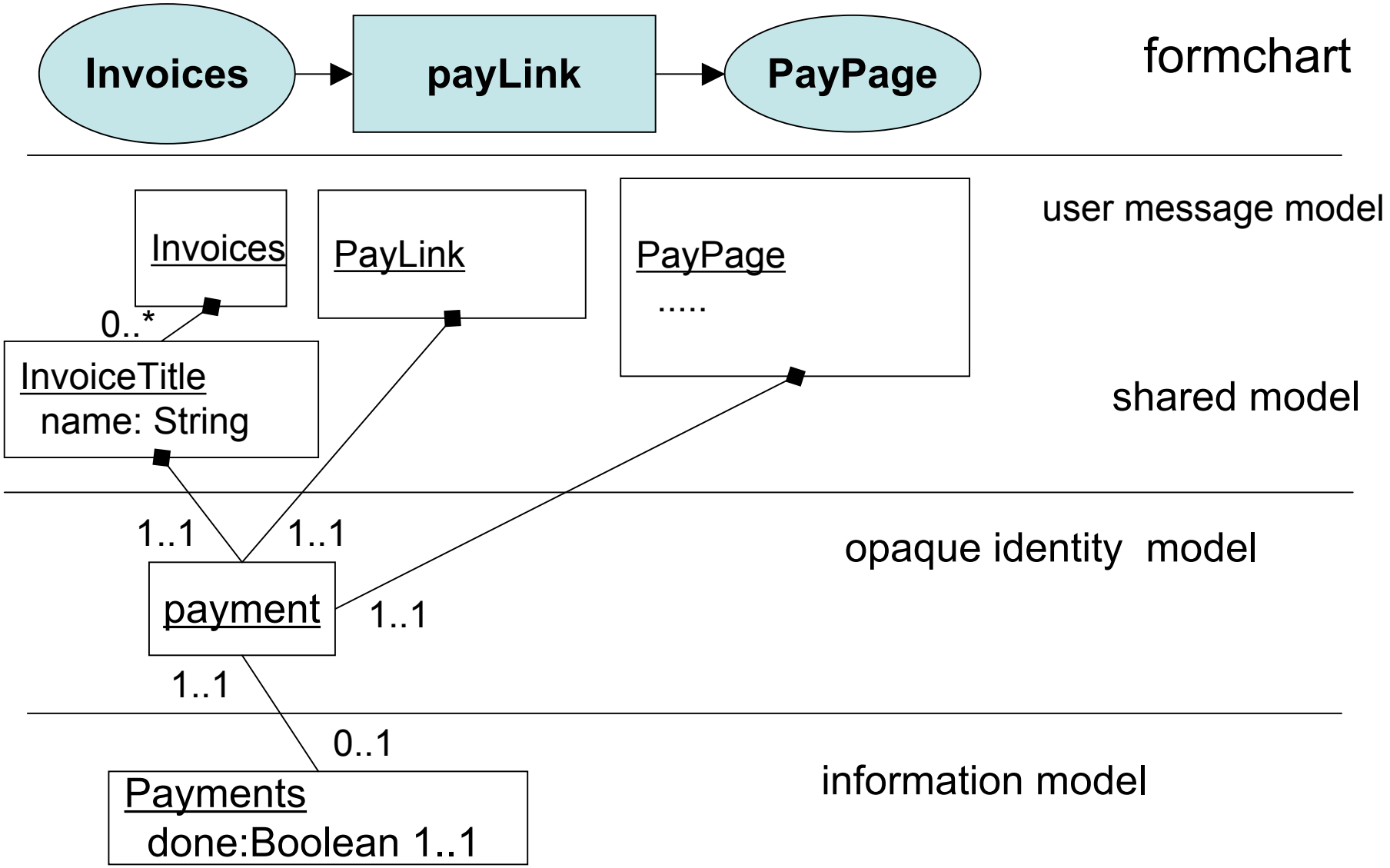
- Requires data model of the messages sent:
- Reservation distinguished from cancellations:
  - message types, typed approach.
- Arrival date different from breakfast choice:
  - attribute types
- Arrival date different from departure date:
  - attribute roles
- Still only archive of submitted forms.

But more: Functional decomposition

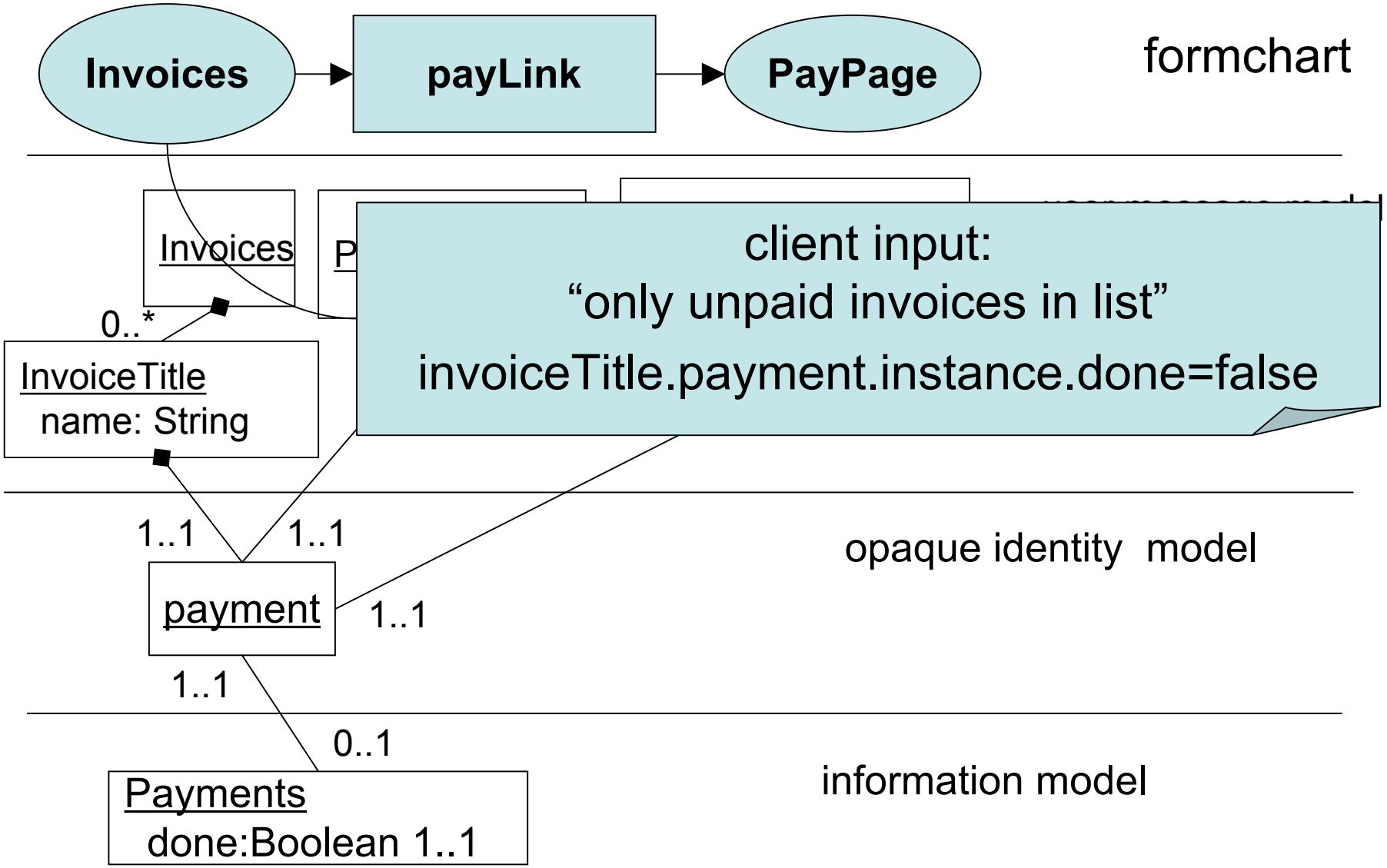
- If user sends request after inquiry: what should the Hotel do?
  - Redo check ?
  - Look up at earlier memo ?

- The definition of the current state naturally occurs as subfunction of memo generation.
- The current state is a view on the archive
- Contains reference data

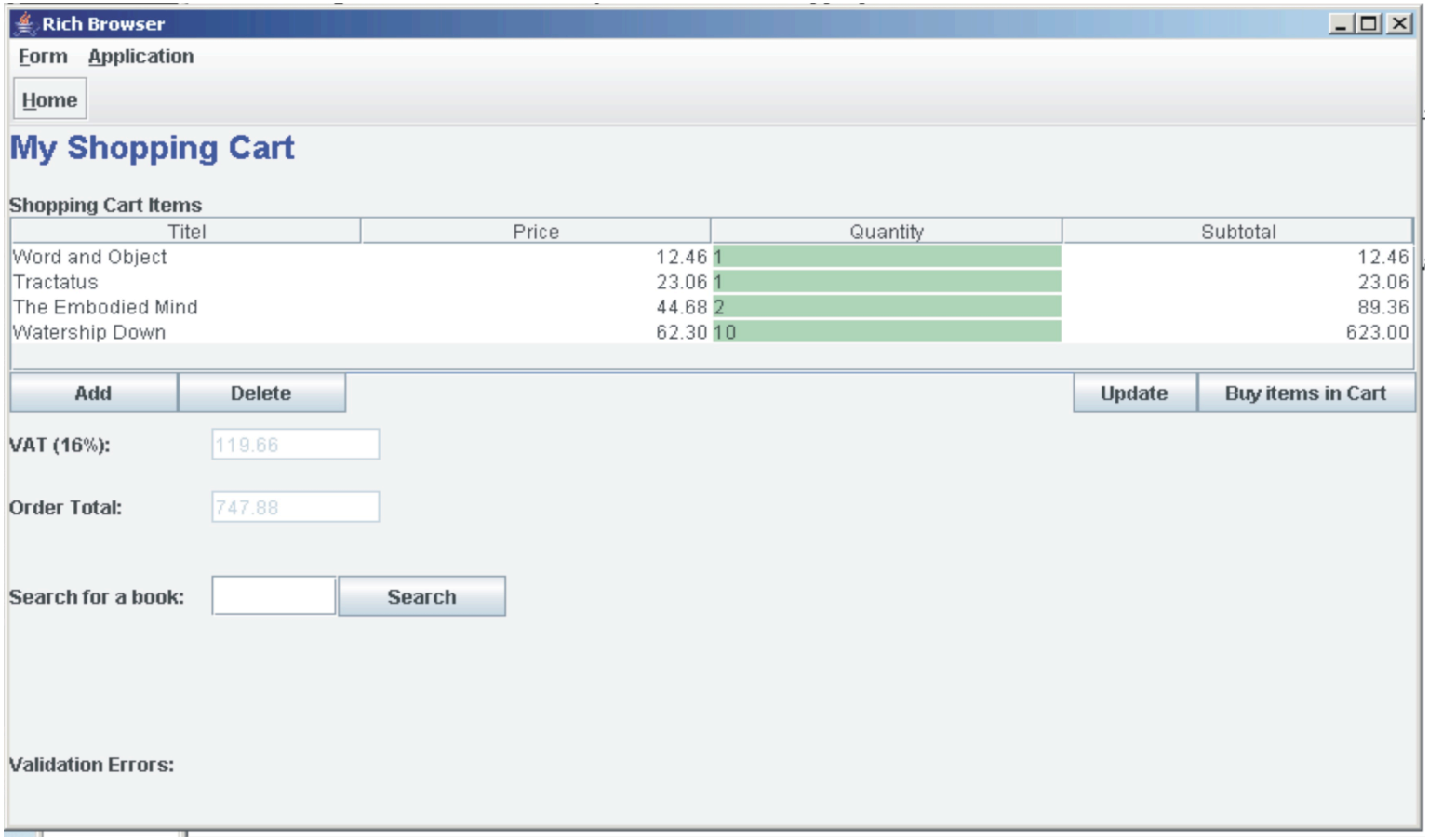
Information model



Information model used in constraints



A Spreadsheet Client for Web Applications [Chan, Flaherty, Weber 2006]



An Architecture for fast Ajax-enabled Web Forms [Chan, Flaherty, Weber 2006]

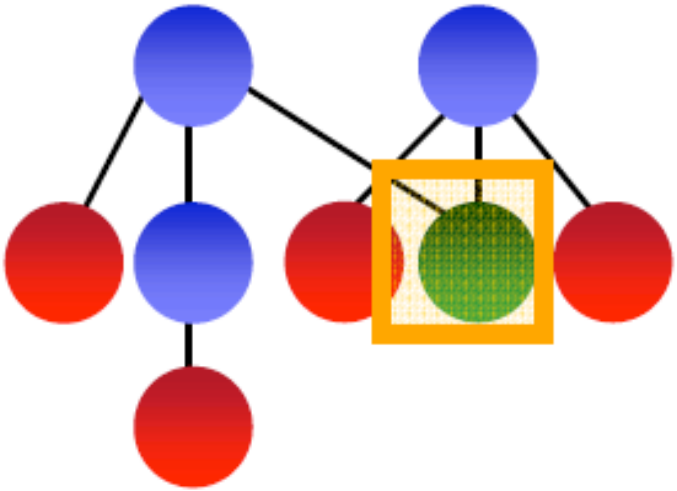
zwiebel

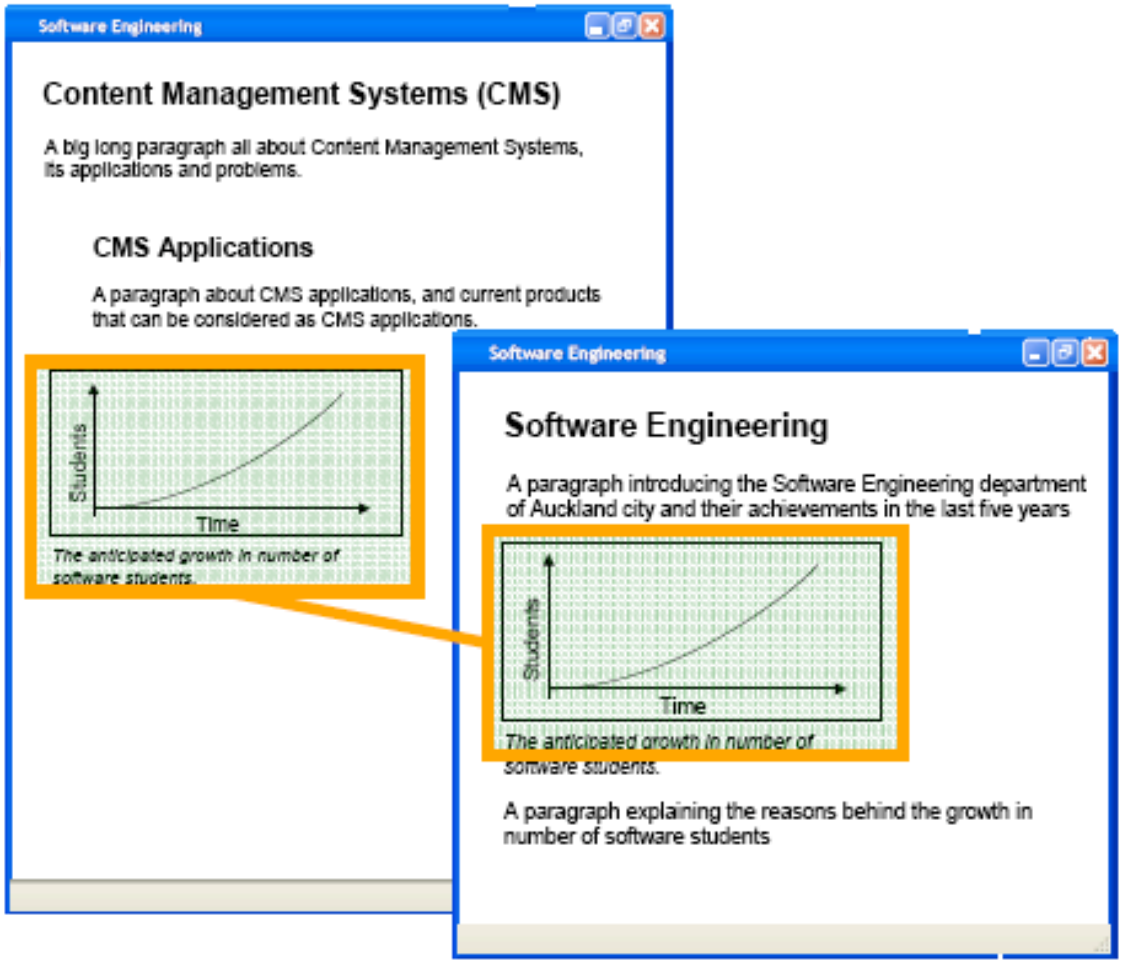
FIRST_NAME	LAST_NAME	STREET	TOWN	PersonID
DEJA	ZWIEBEL	SH 1	Oaro	451220.0
ADRIAN	KUZYK	Zwies Road	LINTLEY	729428.0
AMANDA	ZWIEBEL	SH 2	Edgecumbe	939276.0
ANNETTE	BE	Zwies Road	LINTLEY	584845.0
ANTIONE	FLOTT	Zwies Road	LINTLEY	195420.0
ASHLEA	GAHN	Zwies Road	LINTLEY	741064.0
BARB	HALPER	Zwies Road	BROWNS	944518.0
BESS	OBERG	Zwies Road	LINTLEY	659870.0
BUD	MARCHAN	Zwies Road	BROWNS	74997.0
BUD	MARCHAN	Zwies Road	BROWNS	1110775.0

Found 332 documents.. Click to show more

A Transclusion-based Wiki [Chow, Al-Safi, Weber 2004]

- Relational Content model, text as directed acyclic Graph





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